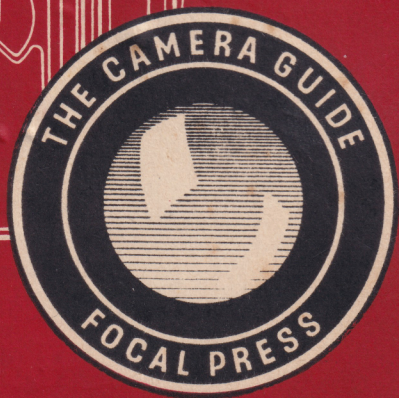
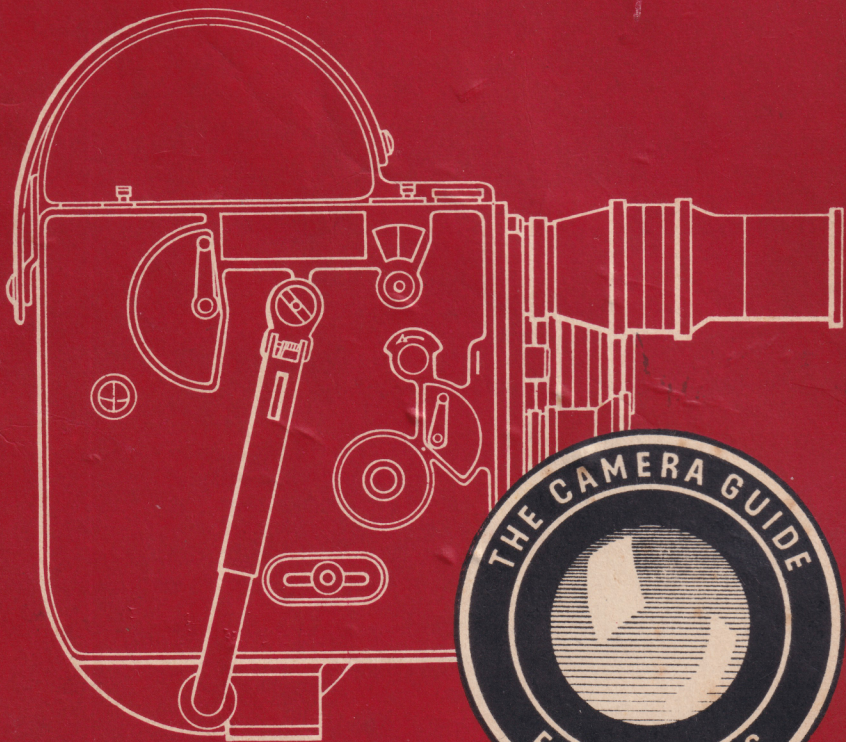


BOLEX GUIDE

H16-H8



11/9

COMPACT
COMPLETE
CORRECT
THE CAMERA GUIDE



This is a *Camera Guide*. It deals with one make of camera, but it is not boosting it. The *Camera Guide* is a Focal Press publication. It is not sponsored or censored by manufacturers, or dependent on them in any way. The *Camera Guide* is as scrupulous in fully describing the camera and advising on its use as the very best type of manufacturer's book of instructions. It is, however, more critical than they could be. No *Camera Guide* will attempt to camouflage the limitations of a camera or make efforts to sell an endless chain of accessories. It is straightforward, practical and devoted to the questions of how to take the best photographs with a particular camera, rather than to praise of it. The *Camera Guide* is compiled by an author who has had long experience in handling the equipment in question. It represents at the same time the gist of all available literature collected by the *Focal Press Circle of Photographers* and filtered through their considered judgment.

Any information regarding cameras additional to or correcting that published in this book will be gratefully received by the publishers, whose experts are also willing to answer individual enquiries by post without charge. Letters should be addressed to The Focal Press, 31, Fitzroy Square, London, W.1, and for replies a stamped and addressed envelope must be enclosed.

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BOLEX GUIDE

FILMING WITH THE BOLEX H.16 and H.8
CINE CAMERAS

By A. J. SURGENOR

Revised by Edwyn Gilmour

Sixth Edition



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THE BOLEX H.16 and H.8

Bolex cine apparatus is manufactured by Messrs. Paillard of Ste. Croix, Switzerland. The range of cameras may be divided into two groups—the professional type models H.16 and H.8, and the amateur type models B.8, C.8 and L.8. This guide deals with the H.16 and H.8; the B.8, C.8 and L.8 are covered by the *Bolex-8 Guide*.

The basic design of the Bolex H.16 and H.8 cine cameras has been retained since 1936 when the first H.16 was produced. The camera body is of cold pressed aluminium alloy covered in black leather and measures $8\frac{1}{4} \times 6 \times 3\frac{1}{8}$ in. The weight with three standard lenses, is 6 lb. 3 oz.

The Bolex H.16 will accommodate standard, daylight loading, 16 mm. film spools of 50 or 100 ft. capacity. The H.8 camera takes standard, daylight loading, double-run 8 mm. film loaded on to 25, 50 or 100 ft. spools. Film loading is semi-automatic.

The film is transported through the camera by two sprockets and a claw, powered by a clockwork motor. The spring will drive 19 ft. of 16 mm. film through the H.16 camera at one complete winding. The spring of the H.8 lasts for $11\frac{1}{2}$ ft. of film.

The motor operating speed is very accurately controlled by a governor and the mechanism is fitted with an automatic cut-out that switches off the motor before it runs down. This ensures the correct exposure right up to the last frame.

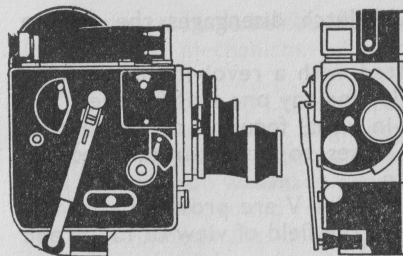
A visual film footage indicator and an audible indicator are fitted to all models and a frame counter is built into all cameras except Series I and II.

The Bolex has five marked operating speeds, 8, 16, 24, 32 and 64 frames per second. The shutter aperture is 190° . A single frame can be exposed, permitting trick and animation effects, and long time exposures are possible.

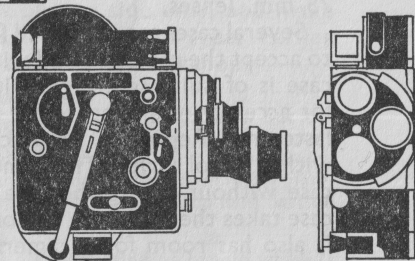
Two operating controls are provided. One locks the mechanism for long running and the other is used for brief shots. The film transport mechanism can be driven forwards
6 or backwards by hand, and by an electric motor in the

THE BOLEX-H SERIES

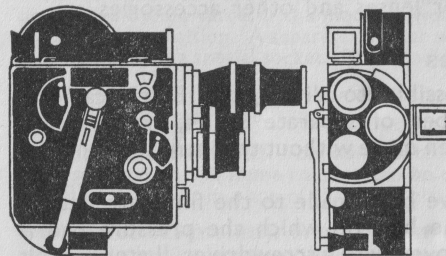
Bolex H.16 camera Series II and III with frame counter added. This is screwed into the position normally occupied by the nameplate. The new extended collapsible winding handle must be used as the rigid one will not clear the frame counter.



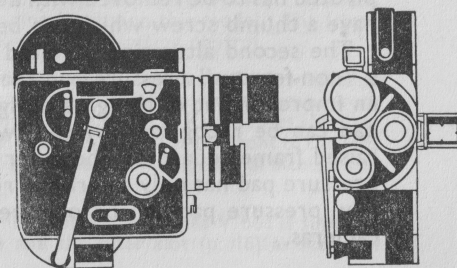
Series IV camera with built-in frame counter, tri-focal viewfinder and old type Kern lenses of 15 mm., 25 mm., and 75 mm. focal length.



Series V camera with built-in frame counter, eye-level rear-focusing attachment and Octameter viewfinder. The latest 16 mm., 25 mm., and 75 mm. Kern lenses are fitted.



Series VI camera with turret handle and filter slot as standard fittings. Otherwise practically the same as Series V models. The Series VII is almost identical except for the eye-level viewfinder, which curves at the front.



forward direction only. A clutch disengages the camera motor.

The Bolex camera is fitted with a revolving turret that carries three lenses for selecting any one lens for use.

The camera has a built-in visual focusing device (except Series I) permitting the lenses to be accurately focused before an exposure is made.

All Bolex models before Series V are provided with tri-focal viewfinders, which give the field of view of 15, 25 and 75 mm. lenses.

Several cases are produced for the Bolex cameras, designed to accept the camera fitted with a 75 mm. lens. The standard case is of suitcase design, with two covered compartments for accessories and space for two films. An alternative zip-fastening "Reporter" case accepts the camera when fitted with a Pistol Grip. The camera can be removed from this case without taking the case from the shoulder. Another case takes the H16 with any of the three Zoom lenses fitted. It also has room for a camera base, Pistol or Surefire grip and compartments for lenses and other accessories.

The Bolex - H Series

Although it is possible to divide the Bolex cameras broadly into a number of separate series, many minor modifications have been made without the introduction of an entirely new model.

Two alterations have been made to the film gate design. On earlier models the bolt on which the pressure pad is pivoted has to be removed with a screwdriver. Later models have a thumb screw which can be removed by hand.

The second alteration resulted from the development of a "non-ferrous" pressure pad that was produced as part of an improvement of the gate design. The old type pressure pad can be recognized by the two raised runners and the raised frame square on the inner surface. The non-ferrous pressure pad has only the raised runners on its surface. The new pressure pad can be obtained and fitted to all earlier cameras.

On cameras made before 1939 a chromium plate covers the intermittent mechanism. Later models have this plate painted black.

The latest Bolex H.16 cameras are being supplied with special sprockets so that single perforated film can be used in the cameras. These sprockets have teeth on one side only. This modification was made necessary through the introduction of magnetic sound recording on film. If you intend to record sound on the completed film in this manner, use special stock with perforations on one side only, and make sure that the camera sprockets are of the new type. Earlier cameras can be modified by a competent workshop.

BOLEX SERIES I (1936) is similar to the above description but the camera is not fitted with a critical focusing screen or frame counter. This model can also be identified by the fact that the name Paillard Bolex is printed on the side of the camera and not on a screwed-on metal plate. Fitting a frame counter to this camera requires a workshop modification as holes have to be drilled into the body.

Series I cameras are equipped with a rigid winding handle which is obstructed by the turret if the motor is wound when the turret is in the swing-out position. A separate, smaller winding handle is provided that screws into a special socket. This handle overcomes the problem.

BOLEX SERIES II (1937). The camera is the same as Series I but with a critical focusing screen built in.

BOLEX SERIES III (1941). This is similar to Series II but with the name plate screwed on. A frame counter can be obtained and fixed to this model with screws in place of the name plate.

BOLEX SERIES IV (1947). A new type winding handle is fitted which collapses to half its length so that it does not foul the turret. There is no provision for a separate winding handle on this model. The frame counter is built in and is complete with resetting control.

BOLEX SERIES V (1951). A multi-focus "Octameter" viewfinder is supplied with this model and gives the field of view of all lenses from 16 to 150 mm. (H.8: 6.5 to 75 mm.). The range of Kern lenses supplied for the Series V camera are all the same diameter at the front of the lens hood, except for the 6 in. lens. This enables the same set of filters to be fitted to any lens.

BOLEX SERIES VI (1954). This is similar to Series V but is supplied with the turret handle (p. 87) and the filter slot (p. 16) as standard

fittings. The operation of the turret of the Series VI has been made more positive with the addition of a spring loaded clip that holds the turret firmly in place when the lower lens is in the focusing position. Minor modifications are the addition of a rubber eye-piece to the viewfinder and a small groove cut diagonally across the edge of the tripod bush to accommodate the Surefire Grip (p. 90).

BOLEX SERIES VII REFLEX (1956). This camera incorporates a direct-vision reflex viewfinder system. This enables unobstructed and continuous viewing of the subject through the lens, both with and without the camera in motion. The "Octameter" viewfinder is still supplied with this model. The filter slot has been re-designed (p. 16).

Only certain lenses are suitable for use on this model (p. 20).

BOLEX SERIES VIII (1959). REFLEX VS. A modification to the Series VII camera introduces a new model. This camera is fitted with a variable shutter device operated by a lever at the side of the turret. In other respects the Reflex VS camera is identical to the Reflex Camera above.

BOLEX H16 T (1959). This model closely resembles the earlier Series VI camera but it does not have the filter slot, nor the Reflex viewfinder or variable shutter of the Series VII and VIII cameras. The Octameter viewfinder is replaced by a viewfinder of four focal lengths, 16, 25, 50 and 75 mm. The "T" model is fitted with the focusing screen so that the eye-level focuser can be fitted.

BOLEX H16 M (1959). This is a modified H16 T with no turret. The camera is supplied with one interchangeable lens and a viewfinder covering four focal lengths. The H16 M has been principally designed for using in conjunction with a Zoom lens which obviates the need for a rotating lens turret.

Bolex Camera Serial Numbers

The serial number of each camera is stamped on the plate in the film chamber. It will be found near the top spool shaft. It is also stamped underneath the turret of those models that have one and can be seen when the turret is swung round.

Each Bolex viewfinder is marked with the number of the camera for which it is matched.

THE BOLEX CONTROLS

The Motor Winding Handle

Two types of handles have been provided on Bolex cameras, a rigid handle on Series I, II and III, and a collapsible one on Series IV, V, VI and VII.

The camera motor is wound by removing the end of the handle from the pin that holds it when not in use, then bringing the handle into position so that the slot is engaged by the boss on the main winding spindle. Now turn the handle anti-clockwise until the motor is fully wound.

Although it is not generally possible to overwind the main spring, exert no force at the completion of winding. The handle can be removed from the spindle by winding in a clockwise direction.

The motor should be left fully wound ready for immediate use. If the camera is to be stored for any period the motor should first be run right down.

The Motor Clutch

This lever is used to engage or disengage the motor from the film transport mechanism. To prevent accidental running of the camera or to free the mechanism for manual operation the clutch lever should be set on "O". Both release buttons are inoperative when this is done.

Should any resistance be felt when setting the clutch lever to "O", press the starting button on the front of the camera.

To wind the motor spring and get the camera ready for use, the clutch lever should be set to "Motor".

The Speed Control

This control governs the rate at which the film is driven through the camera. It can be varied between 8, 16, 24, 32 and 64 frames per second, even when the motor is running. This enables the operator to switch from the normal filming

speed of silent film of 16 f.p.s. to a faster speed for slow motion results.

If the camera is run at 8 f.p.s. the motion will, when the film is projected at normal speed, appear twice as fast as it was when the scene was shot.

Sound is recorded on film at 24 f.p.s. and the camera should always be used at this speed if a sound track is required on the final print.

As the camera shutter is connected to the film transport mechanism, its revolution speed is also determined by the speed control.

On cameras with serial numbers below 100401, the aperture in the shutter exposes each frame of film for 1/20 sec. at 8 f.p.s., 1/30 sec. at 16 f.p.s. (normal silent speed), 1/45 sec. at 24 f.p.s. (normal sound speed), 1/60 sec. at 32 f.p.s., and 1/120 sec. at 64 f.p.s.

Cameras with serial numbers 100401 and above have a double claw mechanism and this necessitated a shutter modification. The exposure times with these more recent models are 1/20 sec. at 8 f.p.s., 1/40 sec. at 16 f.p.s., 1/60 sec. at 24 f.p.s., 1/80 sec. at 32 f.p.s., and 1/160 sec. at 64 f.p.s.

The camera lens aperture must always be adjusted whenever the camera speed is altered so that the exposure received by the film remains unaltered (p. 56).

The Starting Button

The button on the front of the camera is normally used to start the camera. Press to start the mechanism and release to stop it. The pressing action should be as smooth as possible, for a jerking movement will result in camera shake on the first few frames exposed.

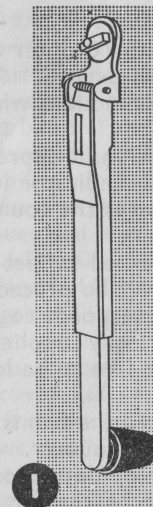
The Release Controls

The knob marked "M-STOP-P" found on the side of the camera sets the mechanism in motion so that it will remain on until the knob is returned to "STOP". For long runs, therefore, push the knob along the lateral slide to position

12 "M" for *Marche* (French).

BOLEX CONTROLS

1. Motor winding handle. The collapsible one closes to half its length and so clears the turret when it is swung out. 2. Film plane mark. 3. Motor clutch lever. 4. Frame counter. 5. Hand crank. 6. Footage indicator. 7. Camera speed control (16—silent speed; 24—sound speed; 64—slow motion speed). 8. Hand crank spindle. 9. Release controls (M—continuous release, P—single shots). 10. Starting button. 11. Time lever, to choose instantaneous or time exposures when shooting single frames.



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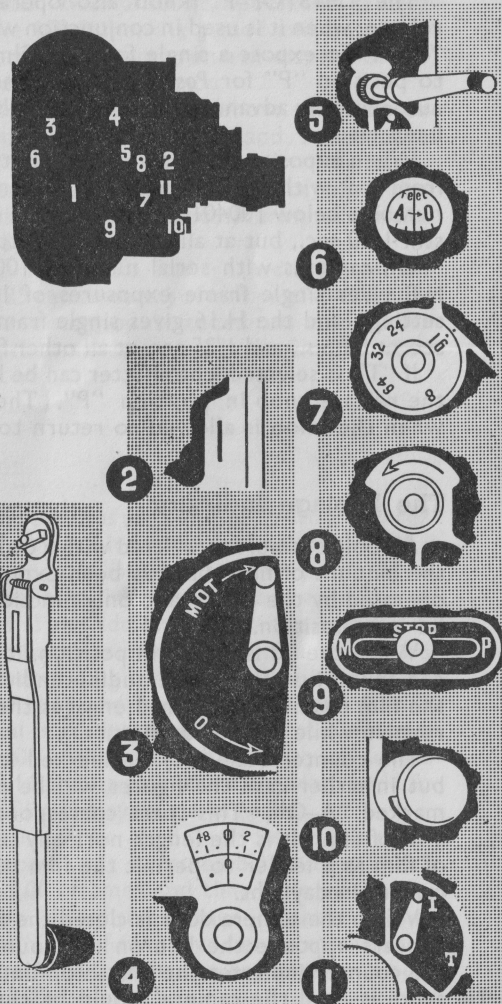
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Above: The audible footage indicator selector. The clicking sound can be cut out or softened by moving the lever towards or to "O".



The "M-STOP-P" knob also operates the single shot release, when it is used in conjunction with the lever marked "I-T". To expose a single frame of film the knob is moved to position "P" for *Pose* (French.) The next film frame is automatically advanced into the gate when the exposure has been made.

When exposing single frames the shutter speed is different from that with continuous running. On cameras with serial numbers below 100401 the single frame exposure at 8 f.p.s. is still 1/20 sec., but at all other f.p.s. settings it is 1/25 sec.

On cameras with serial numbers 100401 and above, the H.8 gives single frame exposures of 1/25 sec. at all f.p.s. settings, and the H.16 gives single frame exposures of 1/25 sec. at 8 f.p.s., and 1/35 sec. at all other f.p.s. settings.

If "T" is selected, the shutter can be held open by holding the release knob in position "P". The shutter will close when the knob is allowed to return to "STOP".

The Footage Indicator

All Bolex cameras are fitted with a counter which indicates the amount of film that has been exposed. The counter is operated by the motor and only functions when the camera lid is in position.

When the lid is placed in position, it depresses the metal rod found just below the audible indicator lever (p. 15) in the film chamber. This rod engages the counter which will revolve while the motor runs.

The counter scale may be marked in feet or in metres, but in either case the figures will be preceded by a space marked "A-O". This space corresponds to approximately 4 ft. of film. It is the length normally supplied on all spools of film as a leader to permit the film to be loaded into the camera in daylight.

When the camera door is closed the film is run until "O" appears opposite the line on the counter. From then on the counter indicates the length of film exposed. If a 50 ft.

14 spool is used the camera should be run for a further 5 ft.

beyond the 50 ft. mark. With a 100 ft. spool, the camera should be run until the 100 ft mark is passed and a straight line appears. In each case this extra run will dispose of the trailer supplied at the end of the film.

When the camera door is opened to remove the exposed spool of film, the metal rod is released and the footage indicator returns to "A".

The footage counter adds the lengths of shot when the camera is run forwards and subtracts shots during which the camera is run (by hand) backwards.

The Bolex also has an audible footage indicator which clicks for every 10 in. (25 centimetres) of film passing through the camera. This sound can be softened or completely switched off by setting the small lever inside the film chamber towards position "O".

The Frame Counter

Series IV, V, VI and VII cameras are equipped with a counter that registers every frame as it is exposed, either by the single shot release, or continuously.

The counter consists of two dials viewed in a small window. Both dials are set by hand and add or subtract the number of frames run forward or backward through the camera. The upper dial is graduated in single frames, 0 | 2 | 4 | 6 and so on up to 50 for the H.16 and from 0 to 100 for the H.8 camera. The lower dial is graduated in groups of 50 frames and is numbered 0 | 100 | 200 | 300 | 400 and so on up to 1,000 frames for the H.16 and up to 2,000 frames for the H.8. For a longer length of film the cycle starts again.

The footage indicator can be used to indicate the total number of frames exposed if it is remembered that 25 ft. of 16 mm. film cover 1,000 frames and that 25 ft. of 8 mm. film cover 2,000 frames. Thus if the footage indicator on the model H.16 shows that 50 ft. of film have been exposed and the frame counter shows 224 frames, the complete number of frames exposed is 2,224.

The Back Winding Handle

All Bolex cameras have a spindle and separate handle for cranking mechanism with the release knob at "M".

To crank by hand, the motor clutch lever should be set on "O" and the separate handle placed on the winding spindle. This is marked on series I, II and III cameras with two arrows, and on Series IV, V, VI and VII with one arrow.

The film is wound back by turning the handle with the arrows (anti-clockwise). The feed spool winds up the amount wound back. To wind the film forwards the handle is turned against the arrows (clockwise).

The speed governor operates when the camera is hand-driven, so the handle should not be cranked faster than the rate set on the speed control.

The Filter Slot

On Series VI and VII cameras, a slot in the camera body immediately behind the filming aperture. Into this fits a slide consisting of two thin metal shims designed to hold a gelatin filter. The camera is provided with one empty slide for use when no filter is required and five extra slides that can be fitted with gelatin filters. Earlier cameras can be modified. The filter slot on the Series VII camera is larger in area than on the Series VI but the filter-slides are thinner.

The Variable Shutter

The latest models of the Reflex (Series VIII) incorporate this. The control lever is at the side of the turret and moves in a short arc. This changes the shutter angle, thus varying the exposure. It is principally designed for making fades, but where faster than normal shutter speeds are needed, the lever can be locked at one of four positions, namely open, quarter closed, (indicated by the symbol $\frac{1}{2}$), half closed (figure 1) and three-quarter closed (figure 2).

To lock the shutter, align the lever with the symbol required and push it gently inwards. To unlock, withdraw the lever after which it can be moved freely.

THE BOLEX LENSES AND FINDERS

The Standard Turret Head

With the exception of the Bolex H16 M, all Bolex cameras are fitted with a semi-circular turret head that can be revolved to bring any of the three apertures in front of the film gate. The three apertures are threaded to take lenses with the standard international thread.

Standard H.16 cameras, i.e. Series I to VI take the standard 1 in. thread (25.5 mm. setting 17.52 mm.). The H16 M and H16 T models accept lenses of the same register. H.8 cameras take standard $\frac{5}{8}$ in. thread (15.8 mm., setting 12.29 mm.).

With the turret in the normal position, the three lens apertures are known as the centre, upper and lower. Because of the semi-circular shape of the turret, the distance between the upper and lower apertures is greater than that between the upper and centre or the lower and centre. This is important when fitting lenses to the turret, for it permits certain lenses to be used without one obscuring the field of another (p. 25).

The turret head of Series I to V cameras is fitted with two sprung rollers which drop into position in slots to engage the centre and upper apertures in exactly the right filming position. From Series VI the addition of a third slot just above the starting button enables all three apertures, including the bottom one, to be "clicked" into position.

The Reflex Turret Head

In 1957, the Paillard Company in Switzerland introduced a new model of the Bolex H.16 with provision for direct vision reflex viewing through the taking lens. In order to make this possible a number of changes to the camera as a whole have been necessary. Although the turret itself is identical to the standard model the turret head is built out a little farther from the camera body to allow room for the system of prisms positioned immediately behind it.

The eye-level focuser, previously an optional attachment, is replaced by a permanent and more streamlined viewfinder.

through which the image is viewed continuously. To avoid stray light entering the viewfinder and fogging the film through the prisms, a lever is fitted to the side of the finder operating a light-tight shutter.

The image when viewed through the reflex finder is magnified six times. Since the first prism is positioned immediately behind the turret, the image is not affected by the rotation of the camera shutter. The need for parallax correction is obviated with the reflex model, and although the "Octameter" viewfinder is rendered unnecessary by the through-the-lens viewing system this piece of equipment is still supplied as an integral part of the Bolex outfit.

Lenses for the Standard Bolex

The normal lens used for filming with 16 mm. cameras has a focal length of 1 in. (25 mm.), while the 8 mm. cameras employ a lens with a focal length of $\frac{1}{2}$ in. (12.5 mm.).

In addition, a lens with a wider angle of view such as 10 or 16 mm. with the H.16, or 5.5 mm. with the H.8 may be employed.

A telephoto lens with a narrow angle of view is also useful. The customary telephoto lens has a focal length of 3 in. (75 mm.), while 8 mm. cameras use two telephoto lenses, one with a focal length of 1 in. (25 mm.), the other with a focal length of $1\frac{1}{2}$ in. (36 mm.).

Although there are a very large number of lenses which can be fitted to Bolex cameras, the lenses generally supplied with new cameras are made by Kern, of Switzerland, in collaboration with the camera manufacturers.

Another make of lens which has been supplied with Bolex cameras are SOM Berthiot. These are made in France.

Schneider and Dallmeyer lenses for the Bolex H.16 are also available with a mount to fit the Bolex H.8 camera.

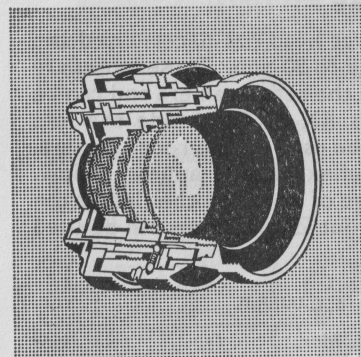
Leitz Hektor lenses have also been supplied with Bolex H.16 cameras, and so have Taylor-Hobson lenses.

In addition to the Dallmeyer lenses mentioned above, Taylor-Hobson, Kern and Berthiot lenses are also available

18 for the Bolex H.8.

BOLEX LENSES

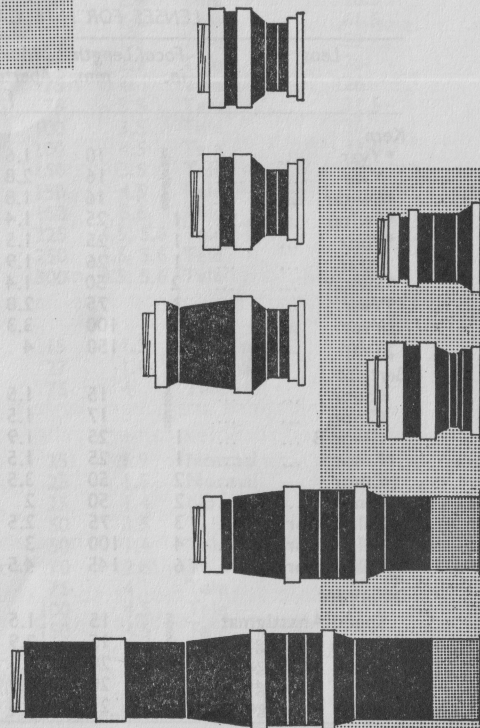
The cross section of the 1 in. (25 mm.) f 1.4 Switar lens shows the precise and complicated construction. Modern lenses leave the factory coated (p. 22). These lenses should be carefully cleaned—dusting with a brush or rubbing lightly with a soft tissue are safe methods.



Four Kern lenses for use with the Bolex H.16 camera (right) are the $\frac{5}{8}$ in. (16 mm.) f 2.8 Yvar, the 1 in. (25 mm.) f 1.4 Switar, the 3 in. (75 mm.) f 2.8 Yvar and the 6 in. (150 mm.) f 4 Yvar. These lenses are all fitted with depth of field indicators and are supplied with focusing mounts.

Three lenses for the Bolex H.8 (left hand column) are the $\frac{1}{2}$ in. (12.5 mm.) f 1.5 Switar, the 1 in. (25 mm.) f 2.5 Yvar, and the $1\frac{1}{2}$ in. (36 mm.) f 2.8 Yvar.

An adaptor ring is available for the $\frac{5}{8}$ in. (16 mm.) Yvar, the 1 in. (26 mm.) Pizar, the 3 in. (75 mm.) Yvar, and the 4 in. (100 mm.) Yvar lens, to allow them to be used on the Bolex H.8.



Lenses for the Bolex Reflex

The re-designing of the turret head has necessitated the introduction of special lenses up to 50 mm. These lenses are produced specially by Kern for the reflex camera and can be identified easily by the letters RX or DV inside the lens mount. Only these lenses can be used on the reflex camera. Lenses available with the reflex fitting appear below. Above 50 mm., the normal range of Kern or other lenses can be used. Any of the Som Berthiot Zoom lenses can be used on the reflex camera.

LENSES FOR H.16 CAMERAS

Lens	Focal Length in.	mm.	Max. Aperture f	Type	Lens Hood Diameter mm.
Kern					
*Yvar ...	10	1.6	Wide angle	33.5	
Yvar ...	16	2.8	Wide angle	33.5	
*Switar ...	16	1.8	Wide angle	33.5	
*Switar ...	25	1.4	Normal	33.5	
*Pizar ...	25	1.5	Normal	33.5	
Pizar ...	26	1.9	Normal	33.5	
*Switar ...	2	50	1.4	Tele	43.4
†Yvar ...	3	75	2.8	Tele	33.5
†Yvar ...	4	100	3.3	Tele	33.5
†Yvar ...	6	150	4	Tele	43.5
Berthiot					
Cinor ...	15	1.5	Wide angle	25	
Cinor ...	17	1.5	Wide angle	25	
Cinor B ...	25	1.9	Normal	25	
Cinor ...	25	1.5	Normal	25	
Cinor ...	2	50	3.5	Tele	42.5
Cinor ...	2	50	2	Tele	33
†Tele-Cinor ...	3	75	2.5	Tele	41
†Tele-Cinor ...	4	100	3	Tele	42.5
†Tele-Cinor ...	6	145	4.5	Tele	42.5
Dallmeyer					
Speed Anastigmat	15	1.5	Wide angle	21.5	
Triple Anastigmat	15	2.9	Wide angle	21.5	
Speed Anastigmat	20	1.5	Wide angle	25.5	
Triple Anastigmat	20	2.9	Wide angle	25.5	
Speed Anastigmat	25	1.5	Normal	25.5	

LENSES FOR H.16 CAMERAS—contd.

Lens	Focal Length in.	mm.	Max. Aperture f	Type	Lens Hood Diameter mm.
Dallmeyer—contd.					
Cinematograph ...	1	25	1.9	Normal	21.5
Super-Six ...	1	25	1.9	Normal	21.5
Triple Anastigmat	1	25	2.9	Normal	21.5
Speed Anastigmat	2	50	1.5	Tele	44
Cinematograph ...	2	50	1.9	Tele	36
Triple Anastigmat	2	50	2.9	Tele	28.5
†Speed Anastigmat	3	75	1.5	Tele	61.5
†Cinematograph ...	3	75	1.9	Tele	52
†Triple Anastigmat	3	75	2.9	Tele	36
†Popular ...	3	75	4	Tele	26
†Telephoto ...	3	75	3.5	Tele	31.5
†Telephoto ...	4	100	3.5	Tele	36
†Telephoto ...	4	100	4.5	Tele	31.5
†Telephoto ...	6	150	3.5	Tele	51
†Telephoto ...	6	150	4.5	Tele	41
†Telephoto ...	6	150	5.6	Tele	36
*Telephoto ...	9	225	4.5, 5.6	Tele	—
*Telephoto ...	10	250	4.5, 5.6	Tele	—
*Telephoto ...	12	300	4.5, 5.6	Tele	—
Leitz					
Summar ...	15	1.5	Wide angle	33	
Hektor Rapid ...	27	1.4	Normal	38	
Telyt ...	3	75	4	Tele	30
Taylor Hobson					
Super Comat ...	1	25	1.9	Normal	26.25
Kinic ...	1	25	1.5	Normal	26.5
Ivotal ...	1	25	1.4	Normal	35.5
Kinic ...	2	50	3.5	Tele	23
Ivotal ...	2	50	1.4	Tele	42
†Telekinic ...	2.8	70	2.8	Tele	42
†Telekinic ...	3	75	4	Tele	30
†Telekinic ...	4	100	4.5	Tele	30
†Telekinic ...	6	150	4.5	Tele	42

*Also available in reflex fitting.

†Suitable for standard and reflex models.

LENSES FOR H.8 CAMERAS

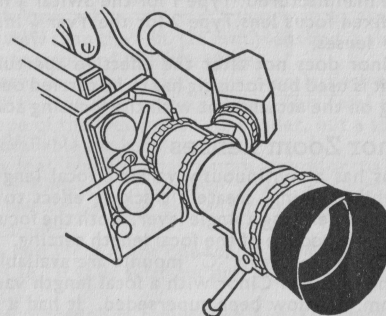
Lens			Focal Length in. mm.	Max. Aperture f	Type	Lens Hood Diameter mm.	
Kern							
Switar	...	...	$\frac{1}{2}$	5.5	1.8	Wide angle	—
Switar	...	...	$\frac{1}{2}$	12.5	1.5	Normal	—
Switar	...	...	$\frac{1}{2}$	13	0.9	Normal	—
Yvar	...	...	$\frac{1}{2}$	13	1.8	Normal	—
Yvar	...	...	1	25	2.5	Tele	—
Yvar	...	...	$1\frac{1}{2}$	36	2.8	Tele	—
Switar	...	...	$1\frac{1}{2}$	36	1.8	Tele	—
Dallmeyer							
Anastigmat	...	...	$\frac{1}{2}$	12.5	1.9	Normal	22.5
Cinematograph	...	...	$1\frac{1}{2}$	38	1.9	Tele	28.5
Triple Anastigmat	...	...	$1\frac{1}{2}$	38	2.9	Tele	25.5
Popular	...	...	$1\frac{1}{2}$	38	4	Tele	21.5
Berthiot							
Cinor	...	...	$\frac{1}{2}$	12.5	1.5	Normal	18.5
Cinor	...	...	$\frac{1}{2}$	12.5	1.9	Normal	18.5
Cinor	...	...	$\frac{1}{2}$	12.5	2.5	Normal	21.5
Cinor	...	...	$\frac{1}{2}$	23	2.3	Tele	20
Cinor	...	...	$1\frac{3}{8}$	35	3.5	Tele	20
Cinor	...	...	2	50	3.5	Tele	26
Cinor	...	...	3	75	3.5	Tele	32.5
Taylor Hobson							
Taytal	...	...	$\frac{1}{2}$	12.5	1.7	Normal	—
Ivotal	...	...	$\frac{1}{2}$	12.5	1.4	Normal	—
Trital	...	...	$\frac{1}{2}$	12.5	2.5	Normal	—
Serital	...	...	1	25	1.9	Tele	—
Serital	...	...	$1\frac{1}{2}$	36	1.9	Tele	—
Telekinic...	...	...	2	50	3.5	Tele	—

The Filtn Lens for 8 mm. Bolex Cameras

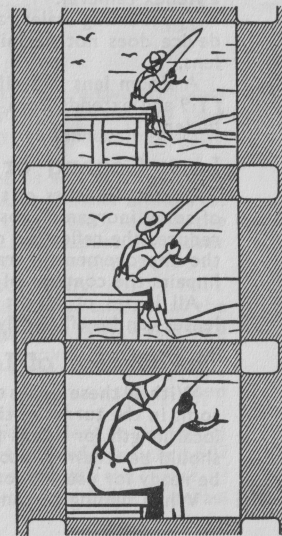
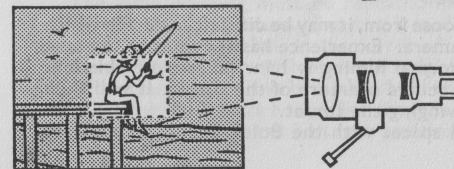
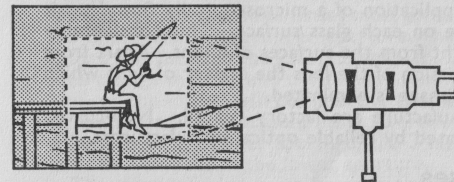
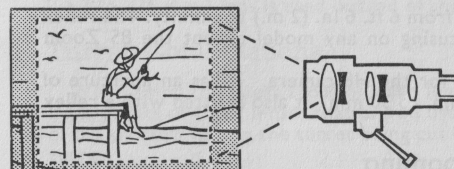
This is a special Yvar $\frac{1}{2}$ in. (12.5 mm.) f 2.8 fixed focus lens with four built-in filters that can be selected by revolving a ring on the lens barrel. The filters are—Wratten 85, Wratten Haze, yellow, red.

The Hyper-Cinor Wide Angle Attachment

This is an attachment for the lenses of the H.8 camera and has the effect of doubling the field of view covered by a $\frac{1}{2}$ in. (12.5 mm.) cine lens, converting it into a wide angle lens with a focal length of $\frac{1}{4}$ in. (6.5 mm.).



Zoom lenses make possible tracking effects without moving the camera. As the lever on the lens barrel is moved to and fro, two lens elements are moved and continuously alter the focal length. The range of the Pan Cinor 70 is from 17.5 mm. to 70 mm. The Pan Cinor 85 extends from 17 mm. to 85 mm. and the Pan Cinor 100 from 25 mm. to 100 mm. The lens aperture remains the same whatever the zoom setting. The viewfinder is a through-the-line reflex type without parallax error.



Two types are manufactured: Type 1 for the Switar $\frac{1}{2}$ in. f 1.5 and the Yvar $\frac{1}{2}$ in. f 2.8 fixed focus lens, Type 2 for the Yvar $\frac{1}{2}$ in. f 1.9 and the Pizar $\frac{1}{2}$ in. f 1.9 lenses.

The Hyper-Cinor does not alter the effective aperture of the $\frac{1}{2}$ in. lens with which it is used but focusing has to be carried out by combining the focusing ring on the attachment with the focusing scale on the lens.

The Pan Cinor Zoom Lenses

The zoom lens has a continuously variable focal length so that the operator can, whilst filming, create a tracking effect towards or away from the subject by operating a single lever. Both the focus and aperture remain constant irrespective of the focal length setting.

Som Berthiot Zoom lenses in "C" mounts are available for all of the H16 models. The first Pan Cinor with a focal length variable between the 20 and 60 mm. has now been superseded. It had a separate viewfinder with a parallax correction, coupled to focusing.

Four models are currently available, with through-the-lens reflex viewfinders. The f 2.4 Pan Cinor 70 extends from 17.5 mm. to 70 mm. The f 2 Pan Cinor 85 extends from 17 mm. to 85 mm. and incorporates a split image rangefinder in the viewfinder. The Pan Cinor 100 Zoom lens extends from 25 mm. to 100 mm. and two versions are available. The regular lens has an aperture of f 3.4 and the alternative lens an aperture of f 2.4. The lenses are available without finders (e.g., for use on a Reflex camera).

The focusing scales range from 6 ft. 6 in. (2 m.) to infinity. The reflex device does not permit focusing on any model except the 85 Zoom lens.

A Zoom lens is available for the H8 camera. It has an aperture of f 1.9 and extends from 10 mm. to 30 mm. It also is fitted with a reflex finder.

Lens Coating or Blooming

Coating consists of the application of a microscopically fine deposit of some inorganic substance on each glass surface. This considerably reduces the reflection of light from the surfaces of a lens. Apart from the improvement in transmission of the lens the scatter of light which impairs the contrast of the image is eliminated.

All lenses of recent manufacture are factory coated. Non-coated lenses can be efficiently treated by reliable optical manufacturers.

The Choice of Lenses

With all these lenses to choose from, it may be difficult to decide which to fit in the turret of the camera. Experience has shown that the best focal length for a lens for normal filming is 1 in. (25 mm.). This lens should be screwed into the centre aperture of the turret. It will then be ready for use without swinging the turret.

24 When filming in confined spaces with the Bolex H.16, the angle of

view of the 1 in. (25 mm.) lens may not be wide enough to cover the subject. In this case a $\frac{5}{8}$ in. (16 mm.) lens may be used. This gives a wider angle of view than the 1 in. (25 mm.) lens and it should be screwed into the lower aperture of the lens turret.

In certain cases an even wider angle lens is desirable and for this purpose a 10 mm. lens may be employed. This focal length is outside the normal scope of the Octameter viewfinder, but a special wide-angle attachment is available for it.

A telephoto lens enables the camera operator to obtain close-up shots of distant subjects. Telephoto lenses work in much the same way as binoculars—they have the effect of bringing a distant subject closer to the camera.

The 3 in. (75 mm.) lens is the one that is generally used as a telephoto on the Bolex H.16. It is popular because it gives sufficient magnification for most work.

If greater magnification is required, a 4 in. (100 mm.) or a 6 in. (150 mm.) lens can be used. In either case a tripod or other firm support should be used at all times.

The degree of magnification for lenses used on the H.16 camera can easily be worked out: it is simply the focal length in inches (or focal length in mm. divided by 25). Thus the magnification of a 2 in. (50 mm.) lens is $2\times$ as compared with the 1 in. (25 mm.) lens, and for the 3 in. (75 mm.) lens $3\times$, and so on. This means that the subject will appear to be twice as close if a 2 in. (50 mm.) lens is used or three times as close if a 3 in. (75 mm.) lens is used instead of the normal 1 in. (25 mm.) lens.

Turret Combinations

When using the latest types of Kern lenses, there are two combinations of sets of three lenses that can be used without the angle of view of the shortest lens in the turret being cut off by the longest lens in the turret.

The first combination has become established as the most popular, for it combines the three lenses most often used. It consists of the 3 in. (75 mm.) lens in the upper aperture, the 1 in. (25 mm.) lens in the centre aperture and the $\frac{5}{8}$ in. (16 mm.) lens in the lower aperture. Never interchange the 1 in. and the $\frac{5}{8}$ in. (16 mm.) lens or the 1 in. and the 3 in. lens, or the longer will cut into the view of the shorter.

The second combination, using two telephoto lenses, consists of the 4 in. lens in the upper aperture, the 3 in. lens in the centre aperture and the 1 in. lens in the lower aperture.

The same warning must be repeated here. Never interchange the 1 in. and the 3 in. lenses. But the 2 in. Switar f 1.4 lens can be used next to a wide angle lens in the turret without risk of cut-off.

Because of the extreme length and weight of the 6 in. lens, it is supplied with a separate bolt that is used to hold the turret head firmly in position against the camera body when the lens is screwed into the turret.

To fix the lens and the bolt into position on standard Bolex cameras, 25

first remove the dust cap from the critical focusing screen (p. 26), then place the bolt in the top aperture and screw it firmly into the thread normally used by the dust cap. Then screw the 6 in. lens into the centre aperture. When attaching the 6 in. lens to the reflex model, a special bolt must be used which holds the turret in position through the bottom aperture instead of the top.

It will be obvious that no other lens can be used in the turret at the same time as the 6 in. lens.

If other makes of lenses are used, it should be ascertained that the longest lens in the turret does not protrude so far that it will be photographed by the lens with the shortest focal length when used. This can be checked with the Bolex gate focusing attachment (p. 88) or the eye-level focusing attachment (p. 87). Either of these accessories will allow you to look straight through any lens in the turret and examine the field of view given by the lens.

To use the gate focusing attachment, insert the accessory into the camera gate, and bring the lens in the combination with the widest angle into the operating position. Set the long focal length lenses to the closest distance of the focusing scale in order to extend them to their maximum length. Then aim the camera at a brightly lit white surface (e.g. a ceiling), and place the eye close to the gate focuser. With the shutter held open, carefully inspect the field of view for cut-off from either of the other lenses. It is advisable to stop the wide angle lens down to about f8 in order to bring any lens that does intrude into sharper focus. By interchanging the various lenses and making use of the greater distance between the upper and lower turret apertures we can resolve various safe combinations. If you use the eye-level focusing attachment instead of the gate focusing attachment you will have to revolve the turret so that the lens with the widest angle of view is in position in front of the critical focusing screen. It will not be necessary in this case to hold the shutter open.

Either method will work equally as well with the H.8 camera.

Under no circumstances should the hood be removed from a lens if it does obstruct any other lens. The hood is fitted to prevent any bright light (e.g. the sun) that may be outside the field of view, from causing "flare" or loss of contrast on the film.

The zoom lens which offers such a wide combination of focal lengths and angles of view is not intended to replace the normal lenses of different focal lengths generally employed on the Bolex H.16. Its main purpose is to produce a tracking effect towards the subject or from the subject. Its optical qualities are not as good as the separate lenses designed to operate at a set focal length. Even with the Pan Cinor "70" its focus is variable only between 17.5 and 70 mm. and does not permit the degree of magnification provided by 100 and 150 mm. lenses.

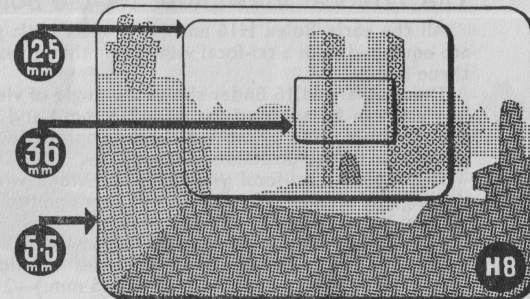
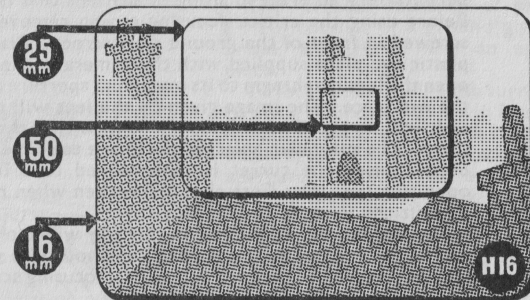
The Critical Focusing Screen

26 On the top of the camera immediately above the upper turret aperture there is fitted on all Bolex cameras (except Series I, VII and

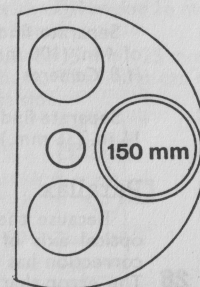
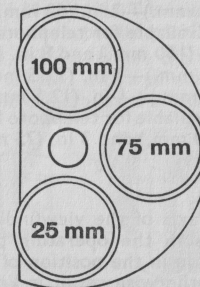
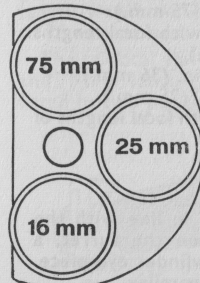
LENS ANGLES AND COMBINATIONS

Top: The lens for normal filming with the H.16 camera has a focal length of 1 in. (25 mm.) to include an average angle of view. A 6 in. (150 mm.) telephoto lens is useful for close-ups of distant subjects, showing a small part of the view on an enlarged scale. A $\frac{5}{8}$ in. (16 mm.) wide-angle lens includes a much larger field than the normal lens.

Bottom: With the H.8 camera the normal lens has a focal length of $\frac{1}{2}$ in. (12.5 mm.), the telephoto lens $1\frac{1}{2}$ in. (36 mm.) and the wide-angle lens $\frac{1}{4}$ in. (5.5 mm.).



Kern lenses can only be used in the combinations (below) in the Bolex turret. Take care to screw the lenses always in the correct apertures, as the long lens will intrude in the field of view of the shorter ones (p. 25).



H16 M) a device consisting of a ground glass prism and a magnifier that permits very accurate focusing of any lens that is swung in front of it. Before using the critical focusing screen remove the dust cap that is screwed in front of the ground glass screen. Place the conical-shaped plastic eye-piece supplied with the camera in the top of the magnifier, open the lens diaphragm to its maximum aperture and place the eye over the eye-piece. The image given by the lens will then be visible.

It will be possible to focus the lens so that the subject is absolutely sharp. The magnifier enlarges the image ten times. When the lens has been focused the turret is then turned to bring the lens into the operating position. Care should be taken when revolving the lens not to shift the focus setting.

The focus setting obtained in this way will apply to any other lens of similar focal length although each telephoto lens should be individually focused before use through the critical focusing screen.

The Tri-focal Viewfinder for the Bolex

All the early Bolex H16 and H8 models built prior to the Series V are equipped with a tri-focal viewfinder that gives the angles of view of three lenses.

The standard H.16 finder shows the angle of view of a 1 in. (25 mm.) lens and can be adjusted for $\frac{5}{8}$ in. (15 mm.) and 3 in. (75 mm.). This adjustment is made by moving the appropriate lever at the front of the viewfinder in the direction of the arrow.

The standard tri-focal viewfinder provided with H.8 cameras gives the angle of view of a $\frac{1}{2}$ in. (12.5 mm.) lens and can be adjusted for 1 in. (25 mm.) and $1\frac{1}{2}$ in. (36 mm.) lenses.

These combinations can be modified so that it is possible to obtain a suitable finder for combinations of lenses as follows:

H.16 Cameras:

1 in. (15 mm.)	— 1 in. (25 mm.)	— 2 in. (50 mm.);
1 in. (15 mm.)	— 1 in. (20 mm.)	— 2 in. (50 mm.);
1 in. (15 mm.)	— 1 in. (20 mm.)	— 3 in. (75 mm.);
1 in. (20 mm.)	— 1 in. (25 mm.)	— 2 in. (50 mm.);
1 in. (20 mm.)	— 1 in. (25 mm.)	— 3 in. (75 mm.);
1 in. (25 mm.)	— 2 in. (50 mm.)	— 3 in. (75 mm.).

Separate finders are available for telephoto lenses with focal lengths of 4 in. (100 mm.), 6 in. (150 mm.) and 8 in. (200 mm.).

H.8 Cameras:

$\frac{1}{4}$ in. (6.5 mm.)	— $\frac{1}{2}$ in. (12.5 mm.)	— $1\frac{1}{2}$ in. (36 mm.);
$\frac{1}{4}$ in. (6.5 mm.)	— $\frac{1}{2}$ in. (12.5 mm.)	— 1 in. (25 mm.).

Separate finders are available for telephoto lenses with focal lengths of $1\frac{1}{2}$ in. (36 mm.), 2 in. (50 mm.) and 3 in. (75 mm.).

Parallax

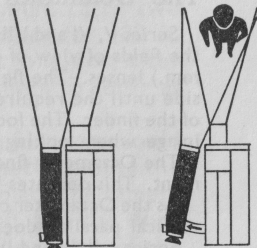
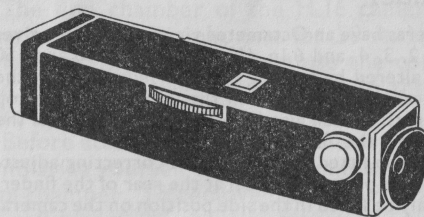
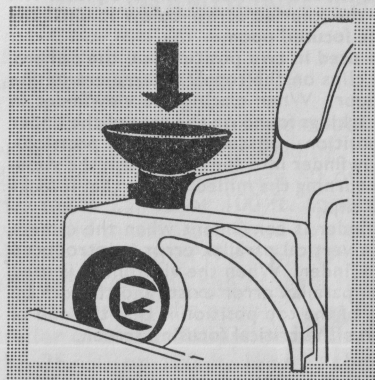
Because the optical axis of the viewfinder is not in line with the optical axis of the lens in the operating position on the turret, a correction has to be made in the position of the viewfinder eye-piece.

28 The error that would otherwise result is known as parallax.

BOLEX FINDERS

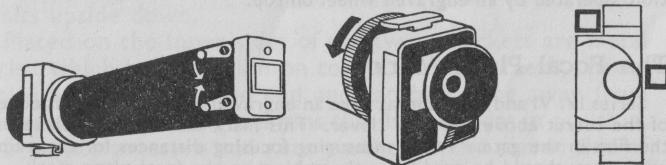
The critical focusing screen (p. 26) consists of a ground glass prism, a magnifier and an eye piece.

To focus a lens, swing the turret to bring the required lens in front of the screen. Open the lens diaphragm to its maximum aperture, and place your eye over the eye piece. The image given by the lens will then be visible. Revolve the focusing ring until the subject is sharp, and then return the lens to the operating position.



The Octameter viewfinder supplied with Series V and VI can be adjusted to give the correct field of view for any lens in the turret (p. 30). The four focal length-viewfinder on the H16 M and H16 T models gives fields of view for 16 mm. to 75 mm. lenses. The finders incorporate parallax correction.

The tri-focal viewfinder can be set to give the field of view of 15 mm., 25 mm., and 75 mm. lenses (p. 28). It is fitted with a parallax adjustment. The finder can be fitted in two positions on the camera: at the top or on the side.



HANDLING THE BOLEX

The viewfinder has a parallax correction device at the eye-piece. The eye-piece is moved sideways by the knurled screw below it until the datum mark is set on the distance focused upon.

The tri-focal viewfinder can be used in two positions on the camera. It can be fixed to the two metal clips on the top of the camera or the two metal clips on the camera door. When placing the viewfinder in position, ensure that the guide markings found on the rear of the finder coincide (red dots for the top position, red dashes for side position). Then introduce the feet of the viewfinder into the clips. Push the viewfinder well home and secure it by turning the milled ring so that it locks against the pin on the rear metal clip.

The top position for the viewfinder is convenient when the camera has to be stored in its case, but a vertical parallax error is introduced which cannot be corrected on the finder. When the viewfinder is used on the side position only a lateral parallax error exists and this can be corrected. Another disadvantage of the top position is that the end of the viewfinder covers and obscures the critical focusing screen.

The Octameter Finder

Series V, VI and VII cameras have an Octameter viewfinder. This gives the fields of view of $\frac{5}{8}$, 1, 2, 3, 4, and 6 in. (15, 25, 50, 75, 100 and 150 mm.) lenses. The field is altered by turning the knurled wheel on the side until the required focal length appears in the window on the top of the finder. The focal length set can also be seen at the bottom of the image when looking through the finder.

The Octameter finder is also fitted with a parallax correcting adjustment. This operates by means of a small wheel at the rear of the finder.

As the Octameter can only be fitted in the side position on the camera, vertical parallax does not arise.

Series I, II, III and IV cameras can be brought up to date by adding the Octameter which is supplied with a complete camera door. The Octameter cannot be fitted without the door because the fittings differ from those for the tri-focal viewfinder.

A new viewfinder was introduced with the models H16 M and H16 T. This gives the fields of view of $\frac{5}{8}$ th, 1, 2 and 3 in. lenses. (16, 25, 50 and 75 mm.) The field is altered by sliding a knob on the side to the appropriate position on a scale. This viewfinder has improved parallax correction, operated by an engraved wheel on top.

The Focal Plane Mark

Series IV, VI and VII cameras have an engraved line near the flat edge of the turret above the "I-T" lever. This mark indicates the plane of the film in the gate. When measuring focusing distances for close-up work they should be read from the subject to the focal plane mark.

Loading the Bolex H.16

All Bolex cameras are equipped with loop-forming guides which greatly simplify loading. The H.16 film chamber is designed to accommodate 50 or 100 ft. spools of film, the H.8 takes 25, 50 or 100 ft. spools. These spools consist of two solid metal sides fixed to a centre core that is slotted to receive the end of the film. One side of the spool will have a square hole and the other a round hole.

The sides of the spool are light tight and as a leader and trailer of film are supplied by the manufacturers in excess of the 25, 50 or 100 ft. length, the camera can be loaded in daylight without fear of fogging the useful length of film.

The film chamber of the H.16 camera should carry two empty take-up spools, one for 50 ft. the other for 100 ft. It is obviously important to use the correct one, for, after use, the empty feed spool is left in the camera to serve as take-up for the next film.

Before attempting to load the camera with film you should familiarize yourself with the film transport mechanism in the film chamber. To remove the camera door, place the camera on a flat surface with the turret to your left and the door uppermost, raise the chromium handle in the centre of the door and turn the knob to the left towards "O". The door can then be lifted off.

It will be noticed that the two spool shafts are machined with a square base and a circular spindle. This square drives the spools, and the circular spindle in conjunction with the spool holes prevents the spools from being placed on the shafts upside down.

Placed on the inner sides of the two sprockets are metal strips which hold the film on to the sprocket teeth. These strips are hinged at one end and can be swung away from the sprocket by lifting the pins that locate them in position.

The gate pressure pad runs parallel to the turret side of the camera and is hinged so that it can be swung out and

completely removed. This is done by lifting the pin at the top of the pressure pad and unscrewing the pivot bolt.

The loop-forming guides are two curved metal strips, one at the top of the gate and one at the bottom. These are closed by turning the centre lever towards you in an anti-clockwise direction to its full extent.

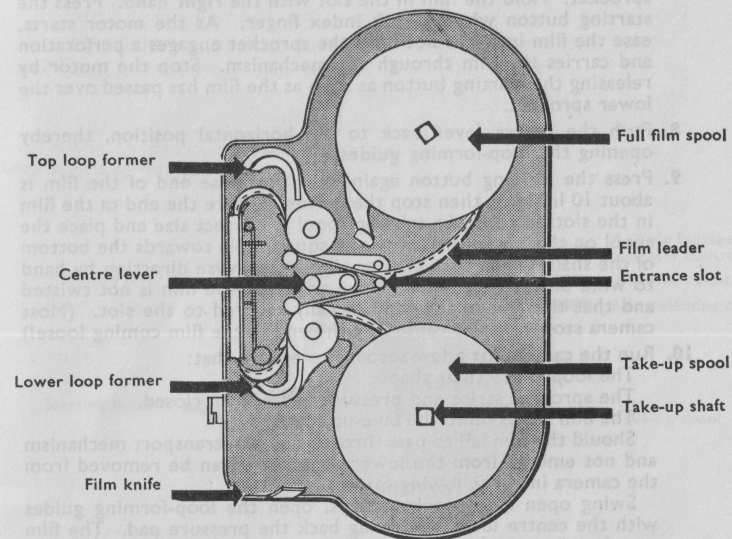
A film trimming knife is fixed to the bottom of the film chamber and consists of a piece of spring steel, shaped to cut the end of the film to an angle that will pass through the automatic loading device.

To load a film:

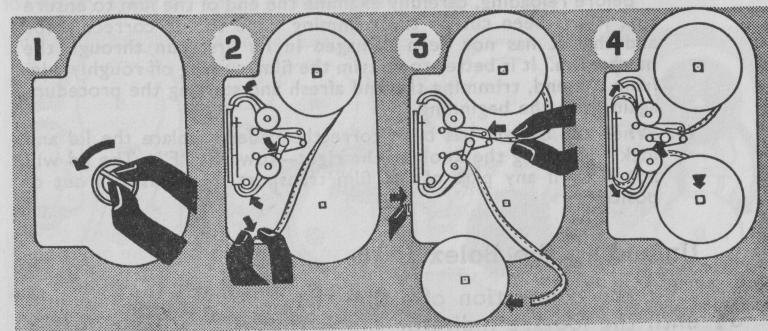
1. Open camera.
2. Clean chamber.
3. Close loop formers.
4. Wind camera.
5. Insert feed spool.
6. Trim film end.
7. Feed in film end.
8. Open loop formers.
9. Secure film on take-up spool.
10. Check running.
11. Close camera.

1. Remove the camera door by turning the knob to the left and lifting off.
2. Dust the film chamber with a brush; swing back the pressure pad and thoroughly clean the gate aperture. (Failure to do this may result in the image of dirt and hairs in the gate appearing on the film.)
3. Close the loop-forming guides by moving centre lever towards you. Note carefully that the two metal strips are held firmly against the sprockets and that the pressure pad is locked against the gate.
4. Turn the camera over and set the motor clutch lever on "Motor". Wind the camera by means of the crank.
5. Place the full spool on the top shaft with the square hole towards the bottom of the shaft. Take care that the film does not uncoil from the spool. As soon as the spool is in position the outer coils will be held in position by the shaped metal film check to the left of the spool.
6. Trim the end of the film by passing it through the knife and pressing hard on the blade. Throw away the loose end.

LOADING THE BOLEX H.16



1. Remove camera door. 2. Trim end of film and close loop formers. 3. Introduce end of film into slot, press starter button and allow 10 in. of film to pass through mechanism. 4. Open loop formers. Secure end of film into slot in a take-up spool and place spool on lower shaft. Replace camera door.



BLX—C

LOADING THE BOLEX H.8

7. Introduce the end of the film into the slot just below the top sprocket. Hold the film in the slot with the right hand. Press the starting button with the left index finger. As the motor starts, ease the film into the slot until the sprocket engages a perforation and carries the film through the mechanism. Stop the motor by releasing the starting button as soon as the film has passed over the lower sprocket.

8. Push the centre lever back to the horizontal position, thereby opening the loop-forming guides.

9. Press the starting button again until the loose end of the film is about 10 in. long, then stop the motor. Secure the end of the film in the slotted core of a take-up spool of correct size and place the spool on the lower shaft with the square hole towards the bottom of the shaft. Then turn the spool in a clockwise direction by hand to wind on the loose film. Make sure that the film is not twisted and that the end of the film is really secured to the slot. (Most camera stoppages are caused by the end of the film coming loose!)

10. Run the camera for a few seconds to ensure that:

The loops keep their shape.

The sprocket strips and pressure pad remain closed.

The film winds on to the take-up spool.

Should the film fail to pass through the film transport mechanism and not emerge from the lower sprocket it can be removed from the camera in the following manner:

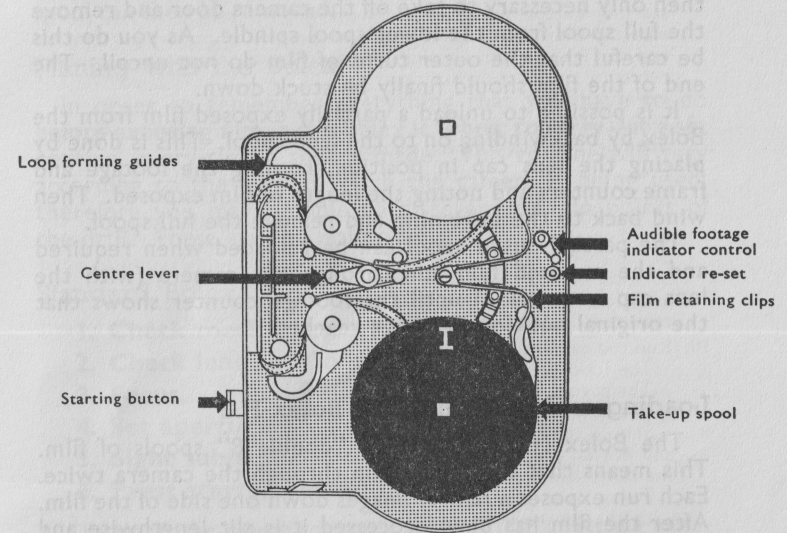
Swing open the sprocket strips, open the loop-forming guides with the centre lever and swing back the pressure pad. The film can then be withdrawn from the sprockets but will still be held in the gate by the claw. The claw is withdrawn by moving the I-T lever to position "T" and pushing the single shot release to position "P". It should be held there until the film has been carefully removed from the gate.

Before reloading, carefully examine the end of the film to ensure that it has been cut by the trimming knife to the correct shape and that it has not been damaged in its first run through the mechanism. It is better to re-trim the film, cutting off roughly 9 in. from the end, trimming the end afresh and starting the procedure again from the beginning.

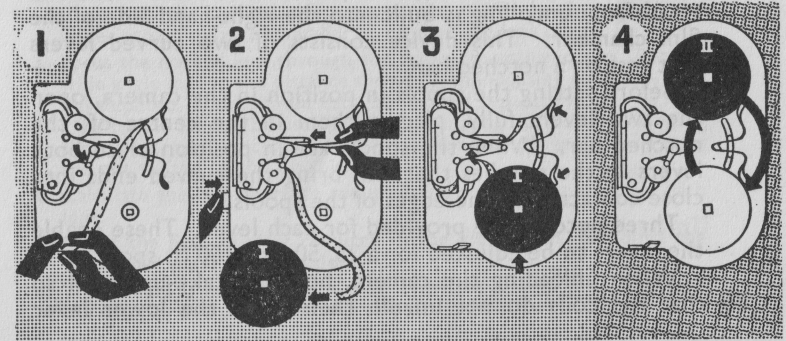
11. When the camera has been correctly loaded, replace the lid and lock by turning the knob to the right—towards "F". The lid will not close if any part of the film transport mechanism is out of position.

Unloading the Bolex H.16

At the completion of a film the camera should be run
34 until the footage indicator shows that the trailer supplied



1. Trim film leader and place retaining clips on edge of spool. 2. Introduce film into slot, press starter, run through 10 in. of film. 3. Attach leader to take-up spool, open loop formers and adjust lower retaining clip. Replace lid. 4. For second run through, remove full spool from lower spindle, invert and exchange for empty spool on upper spindle, then re-load.



at the end of each film has been run through the gate. It is then only necessary to take off the camera door and remove the full spool from the lower spool spindle. As you do this be careful that the outer turns of film do not uncoil. The end of the film should finally be stuck down.

It is possible to unload a partially exposed film from the Bolex by backwinding on to the feed spool. This is done by placing the lens cap in position, reading the footage and frame counters and noting the length of film exposed. Then wind back to the beginning and remove the full spool.

The partially used spool can be reloaded when required and the exposed film run through the camera (with the lens cap in position) until the footage counter shows that the original position has been reached.

Loading and Unloading the Bolex H.8

The Bolex H.8 camera uses "double 8" spools of film. This means that the film is run through the camera twice. Each run exposes a row of images down one side of the film. After the film has been processed it is slit lengthwise and the two ends joined together.

Because of this, the two sides of the H.8 take-up spools are numbered I and II as a guide.

Bolex H.8 cameras are loaded in the manner just described except that the device which prevents the film on either spool from unrolling is built into the right-hand side of the film chamber. This device consists of two curved levers that rest on a notched bar.

Before setting the spools in position in the camera, open the two levers fully, placing them in the centre of the notched bar. When the spools are in position place both levers in the notches that will bring the curved ends into close contact with the edges of the spools.

Three notches are provided for each lever. These enable the levers to be adjusted for a 25, 50 or a 100 ft. spool.

36 When unloading the camera, hold the take-up spool so that the coils do not unroll, then move the lower lever

back to the centre of the notched bar. The full take-up spool can then be removed.

Filming with the Bolex

In order to remember everything that you have to do before exposing film in the Bolex it is best to carry out a set routine, every time a shot is made. This routine will vary according to the way in which the camera is being used, therefore you may be able to disregard certain points of the drill. These are the main points.

Standard Bolex

1. Check mechanism and wind camera.
2. Check lens and finder.
3. Focus.
4. Set aperture.
5. Sight subject.
6. Press starter button to shoot.

1. Check that the release control is set to "STOP". Set the motor clutch lever to "Motor". Wind the camera fully. Set the speed control (normally at 16 f.p.s.; 8 f.p.s. for speeded action, 24 f.p.s. for sound, 32-64 f.p.s. for slow motion. If you intend to use the single shot release set the I-T lever to "I"). Check the footage indicator.
2. Decide what combination of lenses you intend to use and screw them into the correct apertures in the turret head. Adjust the finder accordingly. Remember to remove the lens caps!
3. Focus the normal lens through the critical focusing screen. Set the wide angle lens to the distance shown on the focusing ring. Telephoto lenses should each be focused separately. Bring the lens to be used into the operating position by swinging the turret, making certain that the distance settings on the lenses are not shifted as you do this.
4. Calculate the lens aperture required and set the diaphragm of each lens.
5. Select the field of view required in the viewfinder and adjust the viewfinder parallax correction.
6. The camera is now ready for use. Press the starter button to take the shot, or use the continuous release (p. 12).

Reflex Bolex

1. Check mechanism and wind camera.
2. Check lens and finder shutter.
3. Focus.
4. Set aperture.
5. Sight subject.
6. Press starter button to shoot.

1. Check that the release control is set to "STOP". Set the motor clutch lever to "Motor". Wind the camera fully. Set the speed control (normally at 16 f.p.s.; 8 f.p.s. for speeded action, 24 f.p.s. for sound, 32-64 f.p.s. for slow motion. If you intend to use the single shot release set the I-T lever to "I"). Check the footage indicator.
2. Decide what combination of lenses you intend to use and screw them into the correct apertures in the turret head. Remember to remove the lens caps. Open the viewfinder shutter by pulling down the lever on the side of the finder.
3. Select the lens you require for your shot and revolve the turret if necessary to bring the lens into the taking position. Look through the direct vision finder and set the focus whilst the image is being viewed.
4. Calculate the lens aperture and set the diaphragm of each lens. Since a small amount of light entering the lens is absorbed through the reflex system it is necessary to open the lens aperture half a stop to compensate for this loss. The camera is now ready for use.
5. View the subject through the direct vision finder and press the starter button to take the shot. The subject can be viewed continuously through the lens whilst the shot is being taken.

When filming, never change the lens in use without resetting the viewfinder.

Always keep the camera fully wound.

If you alter the speed control—adjust the aperture setting accordingly.

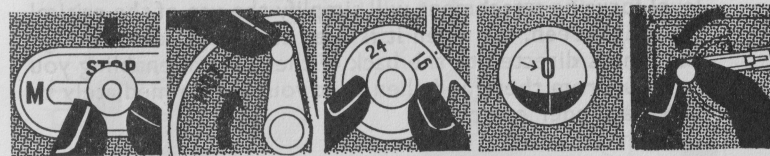
If the distance between the camera and the subject changes—alter the distance settings on the lenses (if the depth of field is insufficient to cover the movement) and re-adjust the viewfinder parallax.

Never wind the film backwards through the camera without replacing the lens caps and checking the footage and frame counters.

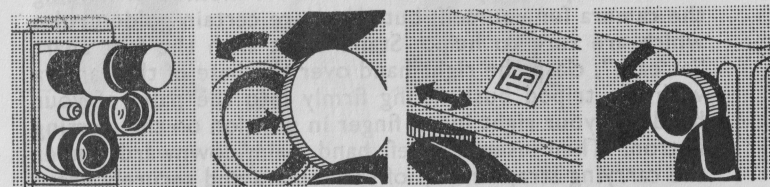
The camera is easier to operate if the turret handle (p. 87) and the eye-level focusing attachment (p. 86) are used.

38 The turret handle will enable you to swing the turret

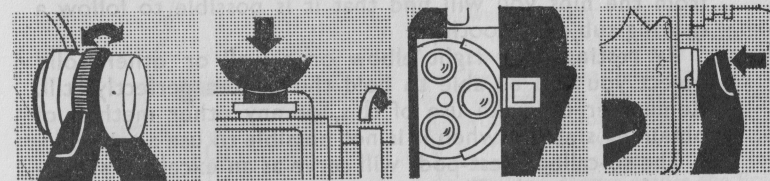
SHOOTING



From left to right: 1. Set release control to "STOP". 2. Set motor clutch lever on "MOTOR". 3. Select camera speed required. 4. Check footage indicator. 5. Wind camera fully by turning handle in an anti-clockwise direction.



From left to right: 6. Place lens to be used in operating position. 7. Remove lens caps. 8. Adjust angle of view of viewfinder to match focal length of lens. 9. Adjust the parallax if required.



From left to right: 10. Set lens aperture for required stop. 11. Focus lens through critical focusing screen. 12. Sight subject in viewfinder. 13. Press starter button smoothly, don't jab it in.

without any danger of shifting the lens setting. The eye-level focusing attachment will simplify the use of the critical focusing screen, for when it is used the image seen through the lens is directed to the back of the camera, enabling you to focus from there and then shift your eye immediately to the viewfinder eye-piece.

Holding the Bolex

The most important thing to strive for when operating the camera is steadiness. You should always remember that a steady camera will produce pictures that remain steady on the screen. Nothing looks worse than a film that constantly bounces about.

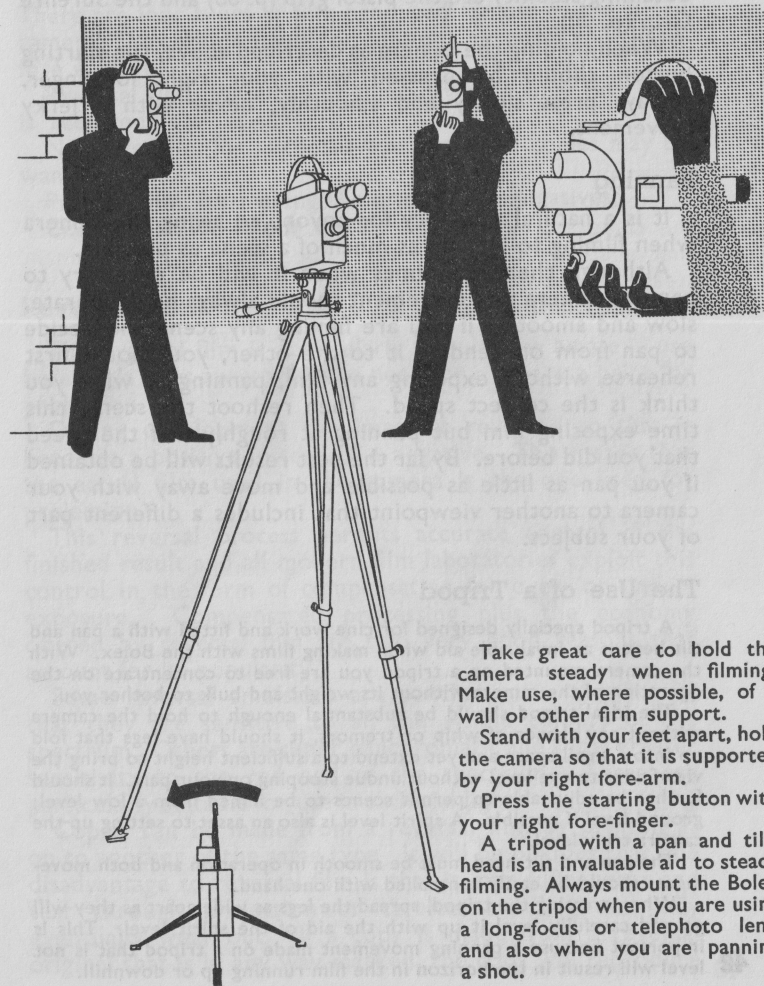
You will probably find a comfortable method of holding the camera for yourself, but there are certain golden rules which are sure to help. Stand erect with the feet apart "at ease", clasp the right hand over the base of the camera with the tripod bush fitting firmly into the palm of your hand and your right index finger in position on the starting button. Then insert the left hand, palm downwards under the carrying strap on top of the camera and securely grasp the top of the film chamber, bringing the forearm down alongside the viewfinder.

You will find that when the viewfinder is raised to your eye your right elbow will be pressed close to your waist. In this position your right forearm will provide a substantial pedestal for the camera and by moving your body from the hips you will find that it is possible to follow a moving subject smoothly.

By resting your right elbow on a wall or other solid object you will be able to hold the camera perfectly still. Remember to make use of this, or any other method of obtaining stability when it is not possible to use a tripod.

The so-called chest-pods will serve as an excellent substitute for a tripod. They consist of a metal rod about 2 ft. in length. The Bolex is screwed on to the top of this rod, the bottom of which is supported by a strap that goes

HOLDING THE BOLEX



Take great care to hold the camera steady when filming. Make use, where possible, of a wall or other firm support.

Stand with your feet apart, hold the camera so that it is supported by your right fore-arm.

Press the starting button with your right fore-finger.

A tripod with a pan and tilt-head is an invaluable aid to steady filming. Always mount the Bolex on the tripod when you are using a long-focus or telephoto lens, and also when you are panning a shot.

Other devices which have been designed to assist in obtaining stability are the pistol grip (p. 88) and the Surefire Grip (p. 90).

When holding the camera as described above, the starting button should be pressed with your right forefinger. Always press slowly and smoothly, never with a jerky movement.

Panning

It is a natural tendency for anyone to swing the camera when filming to include as much of a scene as possible.

Although there are times when it will be necessary to pan the camera this movement should always be deliberate, slow and smooth. If you are filming any scene and decide to pan from one end of it to the other, you should first rehearse without exposing any film, panning at what you think is the correct speed. Then reshoot the scene, this time exposing film but panning at roughly half the speed that you did before. By far the best results will be obtained if you pan as little as possible and move away with your camera to another viewpoint that includes a different part of your subject.

The Use of a Tripod

A tripod specially designed for cine work and fitted with a pan and tilt head is an invaluable aid when making films with the Bolex. With the camera mounted on a tripod you are free to concentrate on the operation of the camera without its weight and bulk to bother you.

The ideal tripod should be substantial enough to hold the camera without any chance of whip or tremors, it should have legs that fold up into a small space and yet extend to a sufficient height to bring the viewfinder to eye level without undue stooping on your part. It should further be adjustable to permit scenes to be filmed from a low level; ground level if possible. A spirit level is also an asset to setting up the camera truly level.

The pan and tilt head must be smooth in operation and both movements should be easily controlled with one hand.

When erecting the tripod, spread the legs as wide apart as they will go and carefully level it up with the aid of the spirit level. This is important because a panning movement made on a tripod that is not level will result in the horizon in the film running up or downhill.

FILMS FOR THE BOLEX

There are four types of film produced for use in the Bolex camera. They are designed for different purposes and therefore each has different characteristics. They are:

Reversal film, for amateur filming where only one copy is required;

Negative film, for purposes where several copies may be wanted;

Positive film, for making the prints from negatives;

Colour film, for colour work.

Reversal Film

This type of film is particularly popular for amateur use because it does away with the need for a separate print for projection.

During development the image is reversed so that it becomes a positive instead of a negative. This means that the actual film used in the camera is the one used for projection.

This reversal process permits accurate control of the finished result and all modern film laboratories exploit this control in the form of compensation for over- or under-exposure. Compensated processing plus the economy offered by reversal film are two very good reasons that account for its popularity.

Some reversal emulsions are panchromatic, that means that they are sensitive to all the visible colours of the spectrum. Others are super panchromatic and show greater sensitivity to the red end of the spectrum. These are particularly suitable for use in artificial light.

Copies can be made from a reversal film by printing it on to another of the same type. It will be obvious that one disadvantage to reversal film is that it may suffer wear and tear through projection or careless handling and may eventually wear out. If a copy is made from a reversal original that is in any way marked, the copy will reproduce

every one of the marks. For this reason if you require a copy from a reversal film you should have it made before you project the original too many times.

You should remember that compensation during processing will also be applied to any fades (p. 82) that you may have produced with your Bolex. They will automatically be treated as patches of under- or over-exposure and their effects as fades will be reduced by about one *f* stop. If you have made any fades on reversal film you should mark the film box "Do not compensate" before returning it for processing.

Most reversal films are sold with their processing charge included in the purchase price. The international companies like Gevaert and Kodak have processing stations all over the world that will accept and process their own film, no matter in which country it was obtained.

Reversal processing is quite a difficult thing for the amateur to undertake and because of pre-paid processing there is little or nothing to be gained by attempting to do it yourself.

Negative Film

As its name implies this type of film yields a negative image and is useless for projection.

A print has to be made from it on a rather complicated machine that grades each portion of the film before exposing the print. This grading ensures the correct exposure for every portion of the film and produces a similar result to the compensation in reversal processing.

The total cost of 100 ft. of negative film and a print from this would exceed the cost of 100 ft. of reversal film. But as the cost of further prints from the negative are much lower than reversal prints from a reversal original, the negative film comes into its own when a large number of duplicates are required. For this reason it is preferred by professional users.

Another advantage is the fact that it can be edited, cut
44 about and re-joined and then printed on to a continuous—

splice-free length of film. It is also possible to produce many trick effects by optical means on the negative before it is printed and each of these effects can be reproduced on every print that is made from it after this.

By using negative film you overcome the danger of scratching the original through projection, and provided it is always carefully handled it will produce perfect prints indefinitely.

Negative emulsions are also produced in panchromatic and super-panchromatic types.

Positive Film

This is used to make prints from negatives and can also be used in your Bolex for such work as animated cartoons, titles, etc.

It employs a slow, non-colour sensitive emulsion which is perfectly satisfactory because its main use is the copying of black and white originals.

Colour Film

All modern colour films are of the reversal, tri-pack type. They employ three separate emulsion layers, one upon the other. The top layer is blue-sensitive only and records the blue part of the image. It is separated from the other two emulsions by a yellow filter layer to cut out all blue light. The middle layer records the green and the lowest red parts of the image.

When the film is projected or viewed by transmitted light the original colours in the subject will be seen.

For filming in colour see p. 106.

The Choice of Film

There is no such thing as the film that is perfect for every job.

You have a choice of films of three speeds in each of the 45

reversal and negative types. You will no doubt be able to decide whether negative, reversal or colour film is best suited to your purpose.

If you select a black and white film you will then have to work out which emulsion speed (i.e. sensitivity) you require.

Film speeds are measured by various systems. In the so-called logarithmic scales, the speed is measured in degrees; every increase of 3° doubles the film speed, allowing the use of the next smaller aperture. Examples are BS log index numbers, Scheiner degrees, etc. While not identical, these two are sufficiently similar for most practical purposes.

In arithmetic systems (ASA and BS arithmetic index numbers, Weston) the speed is directly proportional to the number.

FILM SPEEDS COMPARED

BS Log. Index	ASA & BS Arith. Index	Scheiner	Weston	DIN
18°	5	19°	4	9/10°
19°	6	20°	5	10/10°
20°	8	21°	6	11/10°
21°	10	22°	8	12/10°
22°	12	23°	10	13/10°
23°	16	24°	12	14/10°
24°	20	25°	16	15/10°
25°	25	26°	20	16/10°
26°	32	27°	25	17/10°
27°	40	28°	32	18/10°
28°	50	29°	40	19/10°
29°	64	30°	50	20/10°
30°	80	31°	64	21/10°
31°	100	32°	80	22/10°
32°	125	33°	100	23/10°
33°	160	34°	125	24/10°

The above film speed conversions are only approximate, since each system is based on a different criterion of measurement. They do, however, give a practical basis for comparison.

A doubling of the speed number in the ASA and Weston systems doubles the speed; in the BS log index, Scheiner, and DIN systems each increase of 3° doubles the speed.

Slow Films

The slow, fine grain emulsions (23–25° Sch. or BS Log., 12–20 Weston or ASA) are best suited for use on brightly lit scenes, like those encountered on the deck of a ship, a snow-covered mountain or many landscapes. These slow films have sufficient speed to produce a correctly exposed image under these bright conditions and offer the advantage of fine grain.

High Speed Films

A slow film will, however, be useless for filming in poor light or indoors by the use of artificial light. This is where the fast super-sensitive film (30–32° BS or Sch., 64–100 ASA or Weston) comes into its own. You will find that such an emulsion will produce good results under almost impossible conditions. For scenes such as the dark interior of a church or a railway station where it is not possible to use extra lighting equipment, fast films are ideal. While a super-sensitive emulsion will produce correctly exposed results under poor lighting conditions, the grain of the image is coarser. That might prove objectionable if your audience are seated close to the screen.

Another objection to fast film is that although it might be ideal for some subjects, its use is strictly limited. The reason for this is that it may prove to be too fast when used in daylight. You may find that you require to use a lens aperture of $f/32$ if you use such an emulsion in normal daylight. This small aperture is not available on most cine lenses and you are faced with either over-exposure or the use of a neutral density filter that will hold back some of the light.

Medium Speed Films

It is far better to use a slower film and this is where the medium speed group (26–28° BS or Sch., 20–40 ASA or Weston) serve their purpose. If you are taking your Bolex 47

off for a days' filming and expect to encounter all sorts of subjects and lighting conditions, a film of medium speed will give you the widest filming range.

One very big advantage about the Bolex camera is that it is possible for you to wind a partially exposed film back on to the feed spool and then replace it with a film of more suitable speed for the job you intend to do.

Grain

The coating of the emulsion on cine film is made up of minute particles of silver that do not form a solid mass but are thousands of separate pieces. Under magnification these particles become visible to the naked eye. If you view a picture on a cine screen from a close range, the grain formation will be apparent.

Grain becomes objectionable when numerous particles become lumped together during processing and form larger pieces that can stand very little magnification before they become visible. Coarse grain in an emulsion will also spoil the definition of the image for the edges will appear to be soft and "woolly".

Film manufacturers have produced emulsions of extreme fine grain quality but they suffer from one disadvantage, slow speed (p. 47). Film speed and grain tend to go together in the manufacture of an emulsion and result in the fact that high-speed films usually have comparatively coarse grain in the same way as slow films have finer grain.

Film Quality

Films produced by different manufacturers vary in their tone quality. For instance, Kodak films give a hard black result, whereas Gevaert films produce rather a warm tone almost sepia in colour. Which is the better is a question of personal choice.

There is one important point that arises out of this difference of tone quality. When you have selected a certain make of film—stick to it! Otherwise you will find

that if you splice portions of one film into another the sudden change from cold black to warm black will be very noticeable and even unpleasant.

Colour Films

Although there are some subjects that demand the use of colour film, the recent rise in its popularity shows that it is now being used almost indiscriminately. This is not necessarily a wise thing for certain subjects reproduce much better in black and white than in colour. The grey buildings of a big city, the murk of a November fog, the hard, metallic brilliance of machinery, these are examples and of course there are many more.

Think twice before you load your Bolex with colour film. Ask yourself if your subject really calls for it.

Colour film is available in two types; one type is produced for use in daylight, the other in artificial light. You will quite often be confronted with the problem of which type to load when you know that you will require to film under both lighting conditions on the same spool of film. For instance you are filming a wedding and will want shots at the church in daylight. You will also want to make a film at the reception and will have to expose this by artificial light.

There are two answers to this problem. One is to load daylight type film for the outdoor scenes and then backwind the partly exposed film and reload an artificial light film for the interior scenes.

The second method is to load an artificial light film into your Bolex and use it in daylight with a correction filter on your lens (p. 52). The filter can be removed when filming in artificial light and so enables you to use the same film for both jobs. This will save the bother of backwinding and reloading and will produce perfectly satisfactory results.

The basic rule when choosing a film is—select the right film for the job! You will get better results this way than you will if you try to fit the job into the film that you happen to have in your camera.

FILMS FOR THE BOLEX

Type				Size	Speed		ASA and Weston III
					BS	Weston II	
REVERSAL FILMS							
Anso							
Hypan ...	...	...	...	8 & 16 mm.	26°	25	32
Triple S Pan ...	...	...	...	8 & 16 mm.	31°	80	100
Perutz							
Reversal ...	...	...	...	8 mm.	25°	20	25
					31°	80	100
					37°	320	400
Gevaert							
Gevapan 23 Micro ...	...	...	...	8 & 16 mm.	22°	10	12
Gevapan 26 Super ...	...	...	...	8 & 16 mm.	25°	20	25
Gevapan 32 Ultra ...	...	...	...	8 & 16 mm.	31°	80	100
Kodak							
Plus X ...	...	...	...	16 mm.	28°	40	50
Tri X ...	...	...	...	16 mm.	34°	160	200
NEGATIVE FILMS							
Anso							
Superpan ...	...	...	...	16 mm.	28°	40	50
Gevaert							
Panchromosa ...	...	...	...	16 mm.	26°	25	32
Ilford							
H.P.S. ...	...	...	...	16 mm.	37°	320	400
H.P.3 ...	...	...	...	16 mm.	31°	80	100
F.P.3 ...	...	...	...	16 mm.	28°	40	50
Pan F ...	...	...	...	16 mm.	22°	10	12
Kodak							
Plus X ...	...	...	...	16 mm.	30°	64	80
Tri X ...	...	...	...	16 mm.	36°	250	320
COLOUR FILMS							
Agfacolor (Daylight) ...	...	...	...	8 & 16 mm.	24°	16	20
Ansochrome (Daylight) ...	...	...	...	8 & 16 mm.	25°	25	32
Super Ansochrome ...	...	...	...	16 mm.	31°	64	100
Gevacolor (Daylight) ...	...	...	...	8 & 16 mm.	22°	10	12
(Art. light)	...	...	...		22°	10	12
Kodachrome (Daylight) ...	...	...	...	8 & 16 mm.	21°	8	10
(Type A)	...	...	...		23°	12	16

FILTERS FOR THE BOLEX

Photographic filters consist of good quality optical glass that has been dyed a certain colour or a piece of dyed gelatine that is sandwiched between glass.

These filters are fitted into a mount and then clipped on to the front of the camera lens.

But first let us see what we really want filters for.

Filters for Correction

Sunlight contains all the colours of the spectrum, and looks white. The purpose of a filter is to absorb light of certain colours, thus tinting the white light, and altering the tone reproduction of the film.

The reason why a filter is used with black and white film is that the film does not record different colours of a subject with the brilliance as the eye sees them.

For example—the eye will appreciate the difference in brilliance or contrast between a blue sky and the white clouds. A panchromatic film, however, will show no marked degree of contrast between the two and the white clouds will be lost against an equally white sky.

A filter of a colour complementary to blue—red or yellow—will absorb some of the blue light from the sky and prevent it from reaching the film. The result will then show white clouds against a darkened sky.

The contrast between the two can be varied by the colour of the filter that is used. A red filter in this case will absorb most of the blue and produce a sky that is almost black, whereas a yellow filter will render the sky as a medium tone.

This principle is valid for all filters. They will absorb light of a complementary colour and transmit light of their own colour.

The usual filters for work with black and white film are yellow, orange, red and green. The first three give good control over sky contrast and of course can be used in many other ways. The green filter serves its purpose with

landscape work where it is desired to hold back some of the blue from the sky but transmit without interference the green from the foliage in the scene.

Filters for Effect

As an example of the degree of control over contrast that we can exercise with filters let us suppose that we are to film a white flag bearing a red cross against a blue sky.

If we film this subject without a filter we will obtain a result of a white flag against a white background with the cross only just visible.

If we employ a red filter we will darken the sky so that the flag shows against it but the cross and the flag will both be almost the same degree of white.

So far we have not yet obtained the result we require. We need a green filter for this job. It will reproduce a white flag with a dark cross on it against a toned-down sky.

Filter Factors

Because a filter absorbs some of the light that would otherwise pass through the lens, the film will receive less exposure unless an adjustment is made to the lens aperture. All filters are given an exposure factor by the manufacturer and you must remember this and make use of it.

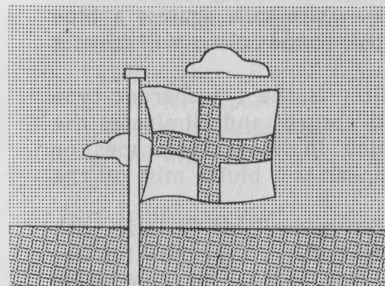
Generally, a yellow filter has a factor of 2-4 (open up the lens aperture by 1 or 2 stops); green filters have a factor of 3-4 (open up 2 stops), while red filters need an 8-fold exposure increase (open up 3 stops).

Never use a filter unless you have a reason for it.

Filters for Colour Film

There are two types of filters made for use with colour film: correction filters and conversion filters.

Correction filters are employed to absorb any excess colour in the light reflected from the subject. For instance, when filming in sunlight of a red hue, a pale blue filter will



This drawing of a red cross upon a white flag standing in a green field is a good example of the way in which filters will alter the colour rendering of a subject.

The shots taken through the yellow, orange and red filters give marked contrast between the white flag and the blue sky but none of them produce the required contrast between all three colours.

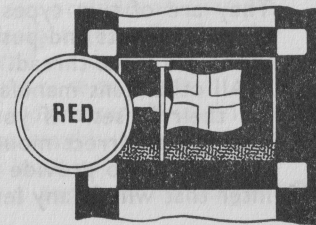
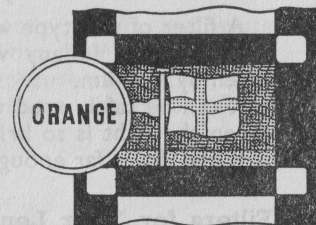
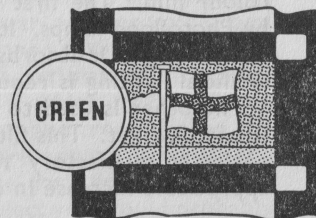
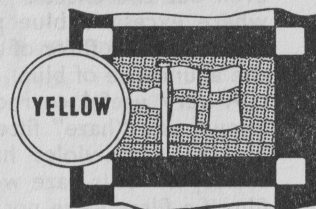
The shot through the green filter shows the best result, for a green filter will slightly darken the blue of the sky and also the red of the cross. At the same time, it lightens the green of the grass.

The shot through the red filter shows that the filter has absorbed all the blue light and transmitted all the red light. The sky is thus almost black, the green grass is very dark, and the red cross practically white.

A basic rule: to lighten a colour on the film, use a filter of the same colour.

To darken a colour on the film use a filter of the opposite (complementary) colour.

FILTERS FOR FILMING



even out the excess. Or if you are filming in conditions where excessive blue prevails—white sails against a blue sky and sea—a filter of a very pale straw colour will correct the abundance of blue.

A very useful correction filter is the transparent type known as a “haze” filter. This absorbs and eliminates the invisible ultra-violet haze found in many landscapes or seascapes. This haze would appear as a bluish mist on the film if a filter were not used.

There are two conversion filters available for use with colour film. The first converts daylight type film for use by Photoflood lamps. It is blue in colour but has one major disadvantage. It absorbs so much light that a vast amount of artificial lighting is required for satisfactory results.

The other is used to convert artificial light type film for use in daylight. This filter is an amber colour and will yield perfectly satisfactory results. It does not require any appreciable increase in exposure.

The Neutral Density Filter

A filter of this type will absorb a certain quantity of the light without in any way altering the colour rendering given by the film.

It can be safely used with black and white or colour film when the light is so bright that the camera lens cannot be stopped down far enough to produce the correct exposure.

Filters for Your Lenses

There are filters and mounts made for all Kern lenses. They are of two types: screw-in mounts for lenses with threaded fronts and push-on types for older types of lenses without a front thread.

All other lens manufacturers produce mounts and filters for their lenses. If you are using old lenses and cannot obtain the correct mounts for them, your camera supplier will be able to provide adjustable mounts complete with a filter that will fit any lens in your selection.

THE TECHNIQUE OF EXPOSURE

The factors concerned in exposure calculation are:

1. The light reflected from the subject.
2. The lens aperture.
3. The camera speed.
4. The film speed.

The Light

This is dependant on many variable things: the weather, the time of day, the season of the year, and the colour and brightness of the subject. The beginner with a cine camera can very easily be deceived in his estimation of subject brilliance. For instance, look at a white marble statue surrounded by green lawns, fountains and trees. When the sun is shining on this scene the eye adjusts itself to the brilliant white mass and ignores the dark green surround. If you were to make a film of this subject you would probably estimate the correct exposure for the marble but the lawns would be under-exposed.

The wide exposure latitude of modern black and white film would prevent the result from being a complete failure but the first essential in exposure calculation is to train the eye to select the most important parts of the scene and expose for them.

The Lens Aperture

All lenses are provided with an iris diaphragm that can be opened or closed to vary the amount of light that is permitted to pass through. The human eye provides an example of the perfect lens iris. It automatically adjusts itself to the brilliance of the scene. The camera lens does not possess this attribute and you must decide where to set it.

The lens aperture is the effective diameter divided into its focal length. For instance—if the maximum diameter of the lens is $\frac{1}{2}$ in. and its focal length 1 in., it will be marked $f2$. The aperture ring will also show a series of markings—

$f2.8$, $f4$, $f5.6$, $f8$, etc., which indicate the value of the aperture when the iris is closed down to that point. As the iris is closed it will at each position admit half as much light as the aperture or stop preceding it.

As this method of calculating lens values is purely a mathematical one it does not allow for the fact that a lens of fine quality will transmit more light than one of poor quality. Neither does it make an allowance for lens coating or blooming, a method of improving the transmission qualities of a lens.

A new system is therefore growing in popularity. Some lenses are being produced that are marked with "T" stops. This system scraps the mathematical one and is based on the amount of light that a lens actually transmits. If it were possible to have lenses marked with their f -value converted to "T" stops, the poor quality lenses would soon reveal themselves. As it is, a combination of three different makes of lenses in your Bolex turret might give different results when they are all used at the same f -number. Therefore, it is advisable to use lenses that are all made by the same firm and learn by experience how efficient they are.

The Camera Speed

As already stated, the revolving shutter of the Bolex exposes each frame of film for $1/20$ sec. at 8 f.p.s., for $1/30$ sec. at 16 f.p.s., for $1/45$ sec. at 24 f.p.s., $1/60$ sec. at 32 f.p.s., and $1/120$ sec. at 64 f.p.s.

As the chief value of the variable speeds on the Bolex is to control the speed of the motion on the screen we cannot use it to control only exposure.

Let us say that if we wish to alter the camera speed from normal (16 f.p.s. silent speed, 24 f.p.s. sound speed), we then alter the exposure given to each film frame and must compensate for this by the use of the lens aperture.

For instance, when the camera is being run at 16 f.p.s., the correct lens setting may be $f16$. If then the camera is
56 speeded up to 64 f.p.s., the lens must be opened two

full stops so that the film receives the same exposure.

The 8 f.p.s. setting can be used at times to give twice the exposure that would be given at 16 f.p.s. If you are filming a very dark interior in which there is no movement this may give you the extra exposure required for a good result. But remember to hold the shot for twice as long in that case.

The Film Speed

This subject is fully discussed on p. 45. The advice given there is worth repeating. Select a film of the right speed for the job. It will produce a better result than a film that is too fast or too slow.

There is only one way in which the effective speed of a film can be cut down if it is too fast. That is by the use of a neutral density filter. This filter resembles a piece of smoked glass and as it has no effect on the colour rendering of the film it can be used with colour film if required.

Its main use will be with high speed films (p. 47). If these films are used in extremely bright light a lens aperture of $f32$ may be required. A neutral filter of density 0.6 cuts out sufficient light to allow the lens to be set at $f16$ in this case. This is a reasonable aperture and will save the day, but it would still be better to load a film of slower speed and obtain the advantages of finer grain and greater control of exposure.

In Brief

Ask yourself these three questions:

What type of subject is it?

How bright is the light?

What film is in the camera?

With the answers to the questions the tables below will give the right lens aperture to use. They are based on the assumption that the camera speed is set at 16 f.p.s., that you are filming in the summer and that you are not filming within two hours of sunrise or sunset.

APERTURES FOR BRILLIANT SUBJECTS

Distant landscapes, mountain scenery, seascapes and lakes, air photography, sunlit snow scenes.

Film	Clear sky	Hazy sun	Cloudy bright	Cloudy dull
High speed ...	—	*f 11-f 16	f 8-f 11	f 11-f 16
Medium Speed...	*f 11	f 16	f 11	f 8
Colour ...	f 8-f 11	f 5.6-f 8	f 4-f 5.6	f 2.8-f 4
Slow ...	f 11	f 8	f 5.6	f 4

*Using neutral filter of density 0.6.

APERTURES FOR BRIGHT SUBJECTS

Landscapes with some foreground objects or with dark mid-distance. Nearby groups and objects on a beach, or in bright surroundings. Boats and shipping. Athletic meetings. Light-coloured fabrics, flowers and buildings.

Film	Clear sky	Hazy sun	Cloudy bright	Cloudy dull
Fast ...	*f 16	*f 11	f 16	f 11
Medium speed...	*f 8-f 11	f 11-f 16	f 8-f 11	f 5.6-f 8
Colour and slow	f 8-f 11	f 5.6-f 8	f 4-f 5.6	f 2.8-f 4

*Using neutral filter of density 0.6.

APERTURES FOR AVERAGE SUBJECTS

Groups of people in the open, in gardens or street scenes. Life in towns with no heavy objects. Subjects of mixed light and shade.

Film	Clear sky	Hazy sun	Cloudy bright	Cloudy dull
Fast ...	*f 11-f 16	*f 8-f 11	f 11-f 16	f 8-f 11
Medium speed...	f 16	f 11	f 8	f 5.6
Colour and slow	f 8	f 5.6	f 4	f 2.8

*Using neutral filter of density 0.6.

APERTURES FOR SHADED SUBJECTS

Subjects with the sun behind them. Subjects out of the direct sun. Not for heavy shade under trees or large porches.

Film	Clear sky	Hazy sun	Cloudy bright	Cloudy dull
Fast ...	f 11-f 16	f 8-f 11	f 8-f 11	f 5.6
Medium speed...	f 8	f 5.6	f 4.5	f 3.5
Colour and slow	f 4.5	f 2.8	f 1.9	—

On a filming expedition you will find it convenient to set the apertures of the lenses in your Bolex turret ready for immediate use for average subjects in cloudy bright weather.

These settings are:

Fast film:	f 11-f 16
Medium speed film:	f 8
Colour film:	f 4
Slow film:	f 4

Exposure Meters

The use of a reliable photo-electric exposure meter will eliminate guesswork when estimating the required lens setting for a scene. There are several excellent meters designed for cine work.

All these meters employ a light-sensitive photo-electric cell. The cell generates a current when light falls on it. The current moves a needle that traverses a scale of exposure values when the meter is pointed at the subject. A cine meter is fitted with a calculator that takes into account the camera speed, the film speed, and the reading obtained by the photo-electric cell. This calculator will then indicate the correct lens setting for the scene.

The angle of view of an exposure meter is wider than that of a normal cine lens. This means that objects outside the field of view of the camera lens will be inside the field of view of the meter. These objects may influence the reading given by the meter, and in order to cut them out the exposure reading should be taken from a point nearer the subject than the camera position.

The photo-electric exposure meter cannot think. It can only produce an average measurement of all the objects within its field of view. It will include in this average the values of all the dark objects and all the light objects. It is better therefore to point the meter at the lightest part of the subject if you are using reversal film. This will then be correctly exposed and the rest of the tonal range in the subject will fall into place.

Colour film is the exception to this rule. The poor exposure latitude of colour film will nearly always demand some kind of compromise, for it will only give correct exposure over a very limited range of contrast. If your subject includes extreme contrasts of light and shade, for instance, the marble statue mentioned earlier, you will have to decide which part of the scene you consider most important, take the meter close up to it and work from the reading obtained. This method will ensure the correct exposure and thus the correct colour rendering of this part of the subject, but may produce incorrect exposure of areas which are outside the contrast range of the film.

Substitute Readings

It may not always be possible for you to approach the important part of the subject so as to take a close-up reading of it. In such a case try to duplicate the part of the scene by creating the same effect near you.

Suppose you want to film a famous person who will pass some feet away from your camera. The most important part of the scene, as far as exposure is concerned, will be your subject's face. It will be impossible for you to step out of the crowd and make a close reading of the face in question, but there is nothing to stop you from making a reading of the back of your hand. The result will be the same providing the illumination falling on your hand is the same as that falling on the face of your famous person.

Colour Temperature Meters

A colour temperature meter measures the colour balance of light. This is expressed in degrees Kelvin. The higher the colour temperature, the bluer the light, the lower the temperature, the more reddish the light. The colour temperature meter can be used in two ways. In artificial light the meter is used to show the variation between the colour of the light falling on the subject and the colour of light for which the film is balanced. The light source can then be corrected with suitable filters so that this variation is levelled out.

The colour meter is used in daylight in conjunction with colour film in the following manner.

Suppose the scene is lit with the rays of a low, red sun. The colour temperature of this light would be far lower than the 5,900° Kelvin for which the film is balanced. So—set the scale of the meter at 5,900° Kelvin and hold the sensitive part of the meter so that the sunlight falls directly upon it. The pointer on the scale will then show the colour temperature of the sunlight. You then place colour correction filters of a pale shade of blue in front of the sensitive part of the meter until you find the one which causes the pointer to indicate 5,900° K. on the scale.

Place this filter over the camera lens and shoot the scene. It will absorb exactly the right amount of excessive red light in the scene to give correct colour rendering on the film.

However, don't overdo this colour correction. At sunset the light is characteristically yellow, and should not look like midday illumination.

THE TECHNIQUE OF FOCUS

If you take sufficient time and carefully focus the lenses in your Bolex turret you will be rewarded with pin-sharp definition on your films.

Next to correct exposure, correct focusing comes high on the list of basic essentials necessary for the production of a good movie.

Correct focus settings are easy to obtain on cine lenses for they are of such short focal length that depth of field will cover any error that you might make.

Depth of Field

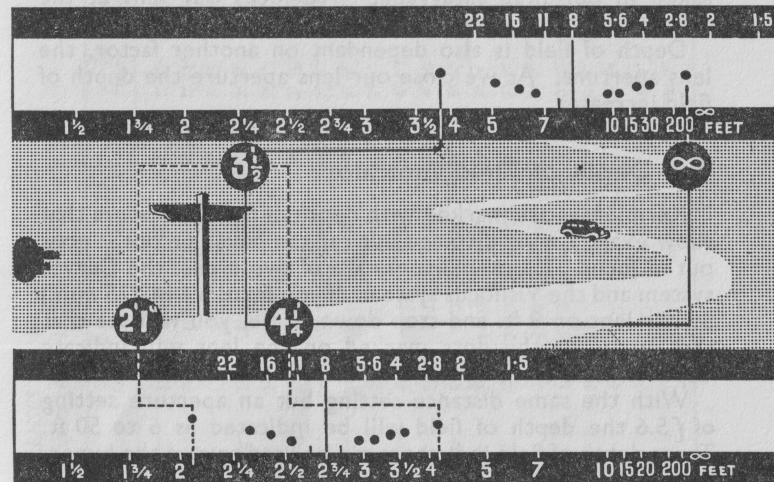
If you are filming a car approaching from a distance and you are using a 1 in. (25 mm.) lens on your Bolex, at what distance should you set your lens? Theoretically if you set your lens at infinity the car will go out of focus as it moves towards you. Or if you focus on 30 ft., the car will move into focus as it approaches that distance and go out of focus as it gets closer than 30 ft. If the theory worked out in practice it would be possible to show the car in focus at one distance only. However, this is not the case, for in practice there is a range of satisfactory sharpness that extends in front of and behind the actual distance focused on. This range of sharp focus is known as depth of field.

How is this depth possible? It is possible because the human eye does not perceive an image to be unsharp unless its departure from pin-point definition exceeds certain limits.

If the lens is focused on a point of light at a certain distance and then the point is moved nearer or farther away, the image of the point given by the lens will increase in size until it becomes a disc. This disc can become as large as 1/30 mm. on the 16 mm. film (or, in practice, about 1/50 mm. on 8 mm. film) before it would show as an out of focus circle when the film is projected on to a screen.

62 With this knowledge we can answer the question we

DEPTH OF FIELD



All Kern lenses are fitted with an indicator to show the zone that will be in focus for any combination of lens aperture and focus setting (p. 64).

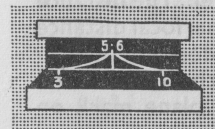
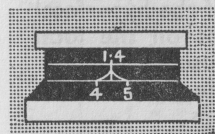
These indicators can be used in two ways. To achieve the greatest depth of field from infinity (upper scale) focus the lens so that infinity mark is set on the last coloured dot on the scale.

With the lens aperture at f 8 the first dot then shows that the depth of field extends from infinity to 3 1/2 ft. The car can thus travel towards the camera between these limits without any need on our part to shift the focus setting.

With near subjects the indicator still shows the actual depth of field (lower scale). The range of satisfactory sharpness is less when the lens is focused on the sign-post 2 3/4 ft. away from the camera. In this case the depth of field extends from 2 ft. 1 in. to 4 ft. 3 in.

The "curves" system used on some Kern lenses (left) also indicates the depth of field. As the lens is stopped down, the curves embrace a larger number of distance settings.

The depth of field is shallowest at f 1.4 and increases when the lens is used at f 5.6. The movement of the curves is automatically governed by the aperture setting ring.



asked in our first paragraph. We focus our lens at the distance that will give us the greatest depth of field.

Depth of field is also dependant on another factor, the lens aperture. As we close our lens aperture the depth of field increases.

The Depth of Field Indicator

Kern lenses are marked with depth of field indicators that show exactly what distance our car can cover before it goes out of focus. These indicators are of two types: the Curves system and the Visifocus system. If you focus a 1 in. (25 mm.) Switar lens on 9 ft. and stop down to f 8, you will see that the curves or the dots marked on the lens will indicate depth of field from $4\frac{1}{2}$ ft. to infinity.

With the same distance setting but an aperture setting of f 5.6 the depth of field will be indicated as 6 to 50 ft. These depth of field indicators can be used to give the hyperfocal distance.

The Hyperfocal Distance

If a lens is focused on an object at infinity the nearest point in focus will be the hyperfocal distance. If the setting is now shifted to this distance, maximum depth of field will result, covering a range from infinity to half the hyperfocal distance. The hyperfocal distance depends on the focal length of the lens and the lens aperture in use.

The depth of field indicators should be used in the following way for hyperfocal distance settings.

Set the required lens aperture.

Turn the focusing ring until infinity is indicated by the curve or the last dot marked on the lens barrel. The distance then shown by the index mark will be the hyperfocal distance and this setting will then give the maximum depth of field.

When measuring the distance between the camera and the subject, always measure from the focal plane mark on the side of the camera.

DEPTH OF FIELD FOR 1 in. (25 mm.) LENSES ON 16 mm. CAMERAS
(For conversion into metric units see p. 110)

Scale set to	f 1.4		f 1.5		f 1.9		f 2		f 2.5		f 2.8	
	From	To	From	To	From	To	From	To	From	To	From	To
1' 6"	1' 5 $\frac{3}{8}$ "	1' 6 $\frac{1}{2}$ "	1' 5 $\frac{1}{4}$ "	1' 6 $\frac{1}{4}$ "	1' 5"	1' 6 $\frac{1}{8}$ "	1' 5"	1' 7"	1' 5"	1' 7 $\frac{1}{2}$ "	1' 5"	1' 7 $\frac{1}{4}$ "
1' 9"	1' 8 $\frac{3}{8}$ "	1' 9 $\frac{1}{4}$ "	1' 8 $\frac{1}{4}$ "	1' 9 $\frac{1}{8}$ "	1' 8"	1' 9 $\frac{1}{4}$ "	1' 7 $\frac{3}{8}$ "	1' 10"	1' 7 $\frac{1}{2}$ "	1' 10 $\frac{1}{2}$ "	1' 7 $\frac{1}{2}$ "	1' 10"
2'	1' 11 $\frac{1}{8}$ "	2' 2"	1' 11 $\frac{1}{4}$ "	2' 2 $\frac{1}{8}$ "	1' 11 $\frac{1}{8}$ "	2' 1"	1' 11"	2' 1 $\frac{1}{2}$ "	1' 9 $\frac{3}{8}$ "	2' 2"	1' 9"	2' 1 $\frac{1}{2}$ "
2' 3"	2' 1 $\frac{3}{8}$ "	2' 4"	2' 1 $\frac{1}{2}$ "	2' 4 $\frac{1}{8}$ "	2' 1 $\frac{3}{8}$ "	2' 4 $\frac{1}{4}$ "	2' 1 $\frac{1}{4}$ "	2' 4 $\frac{1}{2}$ "	2' 1"	2' 5"	2' 3 $\frac{1}{2}$ "	2' 5"
2' 6"	2' 4 $\frac{1}{8}$ "	2' 7 $\frac{1}{8}$ "	2' 4 $\frac{1}{4}$ "	2' 7 $\frac{1}{4}$ "	2' 4 $\frac{1}{2}$ "	2' 8"	2' 4 $\frac{3}{8}$ "	2' 8 $\frac{1}{2}$ "	2' 3 $\frac{1}{2}$ "	2' 9"	2' 3"	2' 9"
2' 9"	2' 7 $\frac{1}{4}$ "	2' 11"	2' 7 $\frac{1}{2}$ "	2' 11 $\frac{1}{4}$ "	2' 7 $\frac{3}{8}$ "	2' 11 $\frac{1}{8}$ "	2' 6"	3' 0"	2' 6"	3' 1"	2' 5 $\frac{1}{2}$ "	3' 1 $\frac{1}{4}$ "
3'	2' 9 $\frac{3}{8}$ "	3' 2 $\frac{1}{8}$ "	2' 9 $\frac{1}{4}$ "	3' 2 $\frac{1}{4}$ "	3' 3 $\frac{1}{8}$ "	3' 3 $\frac{1}{4}$ "	2' 9 $\frac{1}{2}$ "	3' 3 $\frac{1}{2}$ "	2' 8 $\frac{1}{2}$ "	3' 4 $\frac{1}{2}$ "	2' 8"	3' 5"
3' 6"	3' 3 $\frac{1}{2}$ "	3' 9 $\frac{1}{4}$ "	3' 3 $\frac{3}{8}$ "	3' 9 $\frac{3}{8}$ "	3' 2 $\frac{3}{8}$ "	3' 11"	3' 2 $\frac{3}{4}$ "	3' 11"	3' 1"	4' 0"	3' 0"	4' 1"
4'	3' 8 $\frac{1}{2}$ "	4' 4 $\frac{1}{2}$ "	3' 8 $\frac{3}{8}$ "	4' 4 $\frac{3}{8}$ "	3' 7 $\frac{3}{8}$ "	4' 6"	3' 7 $\frac{1}{2}$ "	4' 7 $\frac{3}{8}$ "	3' 6"	4' 8 $\frac{1}{2}$ "	3' 5"	4' 9"
5'	4' 6"	5' 7"	4' 6"	5' 7"	4' 5"	5' 11"	4' 3 $\frac{1}{2}$ "	5' 11"	4' 2 $\frac{1}{2}$ "	6' 3"	4' 1"	6' 5"
6'	5' 3 $\frac{3}{8}$ "	6' 11"	5' 3 $\frac{1}{2}$ "	7' 0"	5' 2"	7' 4"	5' 2"	7' 5"	4' 11"	7' 9"	4' 10"	8' 2"
7'	6' 1"	8' 4"	6' 0"	8' 5"	5' 9"	8' 10"	5' 8"	9' 0"	5' 6"	9' 8"	5' 6"	10' 1"
10'	8' 3"	12' 10"	8' 1"	13' 3"	7' 8"	14' 0"	7' 7"	14' 0"	7' 3"	16' 0"	7' 0"	18' 0"
12'	9' 5"	16' 0"	9' 5"	17' 0"	8' 9"	18' 0"	8' 8"	20' 0"	8' 1"	23' 0"	7' 9"	26' 0"
15'	11' 3"	22' 0"	11' 0"	23' 7"	10' 4"	27' 0"	10' 2"	29' 0"	9' 4"	37' 0"	9' 0"	46' 0"
18'	13' 0"	30' 0"	12' 7"	31' 9"	11' 7"	39' 0"	11' 0"	43' 0"	10' 6"	65' 0"	10' 0"	100' 0"
20'	13' 10"	36' 0"	13' 6"	38' 0"	12' 5"	51' 0"	12' 3"	56' 0"	11' 0"	100' 0"	10' 6"	200' 0"
30'	17' 10"	93' 0"	17' 5"	110' 0"	15' 6"	379' 0"	15' 4"	∞	13' 6"	∞	12' 9"	∞
36'	20' 0"	200' 0"	19' 0"	∞	17' 1"	∞	17' 0"	∞	15' 0"	∞	14' 0"	∞
200'	44' 0"	∞	41' 0"	∞	32' 0"	∞	31' 0"	∞	25' 0"	∞	22' 0"	∞

DEPTH OF FIELD FOR 1 in. (25 mm.) LENSES ON 16 mm. CAMERAS
(For conversion into metric units see p. 110)

Scale set to	f 4		f 5.6		f 8		f 11		f 16		f 22	
	From	To	From	To	From	To	From	To	From	To	From	To
1' 6"	1' 4 $\frac{1}{2}$ "	1' 7 $\frac{1}{2}$ "	1' 4 $\frac{1}{2}$ "	1' 8 $\frac{1}{2}$ "	1' 3 $\frac{1}{2}$ "	1' 9 $\frac{1}{2}$ "	1' 2 $\frac{1}{2}$ "	1' 11"	1' 1 $\frac{1}{2}$ "	2' 3"	1' $\frac{1}{2}$ "	2' 9 $\frac{1}{2}$ "
1' 9"	1' 7"	1' 11"	1' 6 $\frac{1}{2}$ "	2' 1"	1' 5 $\frac{1}{2}$ "	2' 2"	1' 4 $\frac{1}{2}$ "	2' 5"	1' 3"	2' 11"	1' 1 $\frac{1}{2}$ "	3' 11 $\frac{1}{2}$ "
2'	1' 9"	2' 4"	1' 8 $\frac{3}{4}$ "	2' 4 $\frac{1}{2}$ "	1' 7 $\frac{1}{2}$ "	2' 7"	1' 6"	2' 11 $\frac{1}{2}$ "	1' 4 $\frac{1}{2}$ "	3' 9 $\frac{1}{2}$ "	1' 3"	5' 6"
2' 3"	1' 11 $\frac{1}{2}$ "	2' 7"	1' 10 $\frac{1}{2}$ "	2' 8"	1' 9"	3' 0"	1' 8"	3' 6"	1' 5 $\frac{1}{2}$ "	4' 9 $\frac{1}{2}$ "	1' 4"	8' 7"
2' 6"	2' 2 $\frac{1}{2}$ "	2' 10"	2' 1"	3' 2 $\frac{1}{2}$ "	1' 11"	3' 3 $\frac{1}{2}$ "	1' 9"	4' 2 $\frac{1}{2}$ "	1' 6"	6' 3 $\frac{1}{2}$ "	1' 4 $\frac{1}{2}$ "	14' 9 $\frac{1}{2}$ "
2' 9"	2' 4 $\frac{1}{2}$ "	3' 3 $\frac{1}{2}$ "	2' 4"	3' 7"	2' 1"	4' 1"	1' 11"	5' 0"	1' 8 $\frac{1}{2}$ "	8' 2 $\frac{1}{2}$ "	1' 6"	35' 8"
3'	2' 6 $\frac{1}{2}$ "	3' 8 $\frac{1}{2}$ "	2' 5"	4' 0"	2' 2 $\frac{1}{2}$ "	4' 2 $\frac{1}{2}$ "	2' 0"	6' 0"	1' 9"	11' 2"	1' 6 $\frac{1}{2}$ "	∞
3' 6"	2' 11"	4' 6"	2' 8"	5' 0"	2' 6"	6' 1"	2' 2 $\frac{1}{2}$ "	8' 7"	1' 11"	26' 0"	1' 7 $\frac{1}{2}$ "	∞
4'	3' 2 $\frac{1}{2}$ "	5' 3 $\frac{1}{2}$ "	3' 0"	6' 1"	2' 8 $\frac{1}{2}$ "	7' 11"	2' 5"	12' 6"	2' $\frac{1}{2}$ "	∞	1' 9"	∞
5'	3' 10"	7' 3 $\frac{1}{2}$ "	3' 6"	8' 11"	3' 2"	13' 4"	2' 9"	36' 6"	2' 4"	∞	1' 10"	∞
6'	4' 5"	9' 7"	4' 0"	13' 0"	3' 5"	25' 0"	3' 0"	∞	2' 5"	∞	2' 0"	∞
7'	4' 11"	12' 9"	4' 5"	18' 5"	3' 8"	63' 0"	3' 3"	∞	2' 7"	∞	2' 1"	∞
10'	6' 2"	27' 6"	5' 4"	94' 6"	4' 5"	∞	3' 8"	∞	2' 9"	∞	2' 2"	∞
12'	6' 9"	50' 0"	5' 9"	∞	4' 9"	∞	3' 10"	∞	3' 0"	∞	2' 4"	∞
15'	7' 9"	∞	6' 5"	∞	5' 3"	∞	4' 3"	∞	3' 1"	∞	2' 5"	∞
18'	8' 0"	∞	6' 10"	∞	5' 7"	∞	4' 4"	∞	3' 3"	∞	2' 6"	∞
20'	8' 10"	∞	7' 3"	∞	6' 3"	∞	4' 6"	∞	3' 4"	∞	2' 7"	∞
30'	10' 3"	∞	8' 3"	∞	6' 5"	∞	4' 9"	∞	3' 6"	∞	2' 7 $\frac{1}{2}$ "	∞
36'	11' 0"	∞	8' 7"	∞	6' 6"	∞	4' 10"	∞	3' 7"	∞	2' 8"	∞
200'	15' 6"	∞	11' 0"	∞	7' 9"	∞	4' 11"	∞	3' 10"	∞	2' 9"	∞

DEPTH OF FIELD FOR $\frac{3}{8}$ in. (10 mm.) LENSES ON 16 mm. CAMERAS

(For conversion into metric units see p. 110)

Scale set to	f 1.6		f 2		f 2.8		f 4		f 5.6		f 8	
	From	To	From	To	From	To	From	To	From	To	From	To
8"	7 $\frac{1}{2}$ "	8 $\frac{3}{4}$ "	7 $\frac{1}{4}$ "	9"	7"	9 $\frac{1}{2}$ "	6 $\frac{1}{2}$ "	10 $\frac{1}{4}$ "	6 $\frac{1}{4}$ "	11 $\frac{1}{2}$ "	5 $\frac{1}{2}$ "	1' 2 $\frac{1}{2}$ "
9"	8 $\frac{1}{4}$ "	10"	8"	10 $\frac{1}{2}$ "	7 $\frac{3}{4}$ "	11"	7 $\frac{1}{4}$ "	1' 0"	6 $\frac{3}{4}$ "	1' 2"	6"	1' 6 $\frac{1}{2}$ "
10"	9"	11 $\frac{1}{4}$ "	8 $\frac{3}{4}$ "	11 $\frac{1}{2}$ "	8 $\frac{1}{2}$ "	1' 0 $\frac{1}{2}$ "	7 $\frac{3}{4}$ "	1' 2"	7 $\frac{1}{4}$ "	1' 5"	6 $\frac{1}{2}$ "	2' 0"
1'	10 $\frac{1}{4}$ "	1' 2"	10"	1' 2 $\frac{1}{2}$ "	9 $\frac{3}{4}$ "	1' 4"	9"	1' 6 $\frac{1}{2}$ "	8 $\frac{1}{4}$ "	2' 0"	7 $\frac{1}{4}$ "	3' 5"
1' 3"	1' 0 $\frac{1}{2}$ "	1' 6"	1' 0"	1' 7"	11 $\frac{1}{2}$ "	1' 9"	10 $\frac{1}{2}$ "	2' 3"	9 $\frac{1}{2}$ "	3' 4"	8"	13' 0"
1' 6"	1' 3"	1' 11"	1' 2"	2' 0"	1' 1"	2' 5"	1' 0"	3' 4"	10"	6' 5"	8 $\frac{1}{2}$ "	∞
2'	1' 7"	2' 9"	1' 5 $\frac{1}{2}$ "	3' 2"	1' 3 $\frac{1}{2}$ "	4' 1"	1' 2"	7' 7"	1' 0"	∞	10"	∞
3'	2' 1"	5' 5"	1' 11"	6' 10"	1' 8"	14' 0"	1' 5"	∞	1' 2 $\frac{1}{2}$ "	∞	11 $\frac{1}{2}$ "	∞
6'	3' 2"	∞	2' 9"	∞	2' 3"	∞	1' 9"	∞	1' 6"	∞	1' 1"	∞
30'	6' 7"	∞	5' 3"	∞	3' 9"	∞	2' 7"	∞	1' 10"	∞	1' 3"	∞

DEPTH OF FIELD FOR $\frac{3}{8}$ in. (15-16 mm.) LENSES ON 16 mm. CAMERAS

(For conversion into metric units see p. 110)

Scale set to	f 2.8		f 4		f 5.6		f 8		f 11		f 16	
	From	To	From	To	From	To	From	To	From	To	From	To
1'	11"	1' 1½"	10½"	1' 2"	10"	1' 3"	9"	1' 6"	8½"	1' 9½"	7½"	2' 9½"
1' 3"	1' 1"	1' 5½"	1' 2½"	1' 6½"	1' 0"	1' 9"	10½"	2' 1"	9½"	2' 10"	8½"	7' 3½"
1' 6"	1' 3½"	1' 9½"	1' 4½"	2' 0"	1' 1½"	2' 3½"	1' 1"	3' 0"	11"	4' 9½"	9½"	∞
2'	1' 7½"	6"	1' 6"	3' 0"	1' 5"	3' 9½"	1' 2½"	6' 2½"	1' 1"	35' 0"	11"	∞
3'	2' 2½"	4' 8½"	2' 0"	6' 2½"	1' 9½"	11' 0"	1' 6"	∞	1' 3½"	∞	1' 0"	∞
5'	3' 1"	13' 0"	2' 8"	∞	2' 4"	∞	1' 10"	∞	1' 6"	∞	1' 1"	∞
6'	3' 5"	24' 0"	2' 11"	∞	2' 5"	∞	2' 0"	∞	1' 7"	∞	1' 3"	∞
10'	4' 6"	∞	3' 7"	∞	2' 11"	∞	2' 3"	∞	1' 8"	∞	1' 4"	∞
20'	5' 8"	∞	4' 5"	∞	3' 5"	∞	2' 6"	∞	1' 11"	∞	1' 5"	∞
30'	7' 10"	∞	5' 7"	∞	4' 0"	∞	2' 9"	∞	2' 2"	∞	1' 5"	∞

DEPTH OF FIELD FOR 2 in. (50 mm.) LENSES ON 16 mm. CAMERAS

(For conversion into metric units see p. 110)

Scale set to	f 1.4		f 2		f 2.8		f 4	
	From	To	From	To	From	To	From	To
3'	2' 11"	3' 0½"	2' 11"	3' 0½"	2' 11"	3' 0½"	2' 10"	3' 2"
3' 3"	3' 3"	3' 3½"	3' 0½"	3' 0"	3' 0½"	3' 1"	3' 0½"	3' 4"
3' 6"	3' 5½"	3' 6½"	3' 5"	3' 7"	3' 5"	3' 8"	3' 4"	3' 8"
4'	3' 11"	4' 0½"	3' 10"	4' 2"	3' 10"	4' 2"	3' 9"	4' 3"
4' 6"	4' 5"	4' 7"	4' 4"	4' 8"	4' 4"	4' 9"	4' 3"	4' 10"
5'	4' 10½"	5' 1½"	4' 10"	5' 0½"	4' 9"	5' 3"	4' 8"	5' 4"
6'	5' 10"	6' 2"	5' 9"	6' 3"	5' 8"	6' 5"	5' 6"	6' 7"
7'	6' 9"	7' 3"	6' 8"	7' 4"	6' 6"	7' 6"	6' 4"	7' 10"
8'	9' 4"	10' 7"	7' 6"	8' 6"	7' 4"	8' 9"	7' 0"	9' 0"
10'	9' 6"	10' 7"	9' 3"	10' 10"	9' 0"	11' 0"	8' 8"	11' 9"
12'	11' 4"	12' 9"	11' 0"	13' 0"	10' 5"	13' 10"	10' 0"	14' 9"
15'	13' 11"	16' 4"	13' 0"	17' 0"	12' 11"	18' 0"	12' 0"	19' 7"
20'	18' 0"	22' 6"	17' 4"	23' 10"	16' 5"	25' 7"	15' 0"	29' 4"
30'	25' 6"	36' 0"	24' 2"	39' 6"	22' 6"	45' 0"	20' 0"	57' 7"
50'	39' 0"	69' 7"	35' 10"	83' 7"	32' 0"	114' 0"	27' 10"	254' 0"
150'	81' 3"	∞	67' 11"	∞	55' 9"	∞	43' 11"	∞
600'	177' 0"	∞	124' 0"	∞	85' 5"	∞	62' 0"	∞

DEPTH OF FIELD FOR 2 in. (50 mm.) LENSES ON 16 mm. CAMERAS

(For conversion into metric units see p. 110)

Scale set to	f 5.6		f 8		f 11		f 16		f 22	
	From	To	From	To	From	To	From	To	From	To
3'	2' 10"	3' 0 $\frac{1}{2}$ "	2' 9"	3' 3"	2' 8"	3' 1"	2' 7"	3' 7"	2' 6"	3' 10"
3' 3"	3' 0 $\frac{1}{2}$ "	3' 6"	2' 11"	3' 6"	3' 11"	3' 9"	2' 9"	3' 11"	2' 8"	4' 4"
3' 6"	3' 3"	3' 9"	3' 0 $\frac{1}{2}$ "	3' 10"	3' 0 $\frac{1}{2}$ "	4' 0 $\frac{1}{2}$ "	2' 11"	4' 1"	2' 9"	4' 10"
4'	3' 9"	4' 4"	3' 7"	4' 6"	3' 6"	4' 9"	3' 1"	5' 0"	3' 0"	5' 10"
4' 6"	4' 0"	4' 11"	3' 11"	5' 0"	3' 10"	5' 6"	3' 7"	6' 0"	3' 4"	7' 0"
5'	4' 6"	5' 7"	4' 4"	5' 10"	4' 2"	6' 1"	3' 10"	7' 0"	3' 7"	8' 5"
6'	5' 4"	6' 10"	5' 0"	7' 4"	4' 10"	7' 11"	4' 5"	9' 4"	4' 0"	12' 0"
7'	6' 0"	8' 1"	5' 9"	8' 10"	5' 5"	9' 10"	4' 11"	12' 0"	4' 5"	17' 0"
8'	6' 10"	9' 8"	6' 5"	10' 7"	6' 0"	12' 0"	5' 5"	15' 9"	4' 10"	24' 10"
10'	8' 3"	12' 8"	7' 8"	14' 6"	7' 0"	17' 5"	6' 3"	26' 6"	5' 6"	70' 6"
12'	9' 6"	16' 1"	8' 9"	17' 0"	7' 11"	24' 9"	6' 11"	48' 4"	5' 11"	∞
15'	11' 1"	22' 5"	10' 4"	27' 11"	9' 0"	42' 10"	7' 9"	297' 0"	6' 77"	∞
20'	13' 11"	35' 11"	12' 4"	54' 9"	10' 9"	159' 0"	8' 10"	∞	7' 4"	∞
30'	18' 0"	91' 2"	15' 5"	746' 0"	13' 0"	∞	10' 5"	∞	8' 4"	∞
50'	23' 6"	∞	19' 4"	∞	15' 8"	∞	12' 0"	∞	9' 4"	∞
150'	34' 4"	∞	25' 10"	∞	19' 10"	∞	14' 2"	∞	10' 9"	∞
600'	44' 3"	∞	31' 0"	∞	22' 5"	∞	15' 8"	∞	11' 5"	∞

DEPTH OF FIELD FOR 3 in. (75 mm.) LENSES ON 16 mm. CAMERAS

(For conversion into metric units see p. 110)

Scale set to	f 2.5-2.8		f 4		f 5.6		f 8		f 11		f 16	
	From	To	From	To	From	To	From	To	From	To	From	To
4'	3' 11"	4' 1"	3' 10"	4' 1"	3' 10"	4' 1"	3' 9"	4' 2"	3' 9"	4' 4"	3' 8"	4' 5"
5'	4' 11"	5' 1"	4' 10"	5' 2"	4' 10"	5' 2"	4' 8"	5' 4"	4' 7"	5' 6"	4' 5"	5' 8"
6'	5' 11"	6' 1"	5' 9"	6' 2"	5' 7"	6' 4"	5' 7"	6' 6"	5' 5"	6' 8"	5' 2"	7' 1"
7'	6' 9"	7' 2"	6' 8"	7' 3"	6' 7"	7' 6"	6' 5"	7' 8"	6' 2"	8' 0"	5' 11"	8' 7"
9'	8' 8"	9' 4"	8' 6"	9' 8"	8' 4"	9' 10"	8' 0"	10' 2"	7' 8"	11' 0"	7' 4"	12' 0"
12'	11' 5"	12' 7"	11' 1"	13' 1"	10' 10"	13' 6"	10' 4"	14' 4"	9' 10"	15' 6"	9' 1"	17' 10"
15'	14' 0"	16' 0"	13' 7"	16' 8"	13' 1"	17' 6"	12' 5"	18' 11"	11' 8"	20' 11"	10' 7"	25' 7"
20'	18' 0"	22' 0"	18' 0"	23' 0"	17' 0"	25' 0"	16' 0"	28' 0"	14' 0"	32' 0"	13' 0"	45' 0"
30'	26' 0"	34' 0"	25' 0"	38' 0"	23' 0"	43' 0"	21' 0"	52' 0"	19' 0"	70' 0"	16' 0"	200' 0"
50'	40' 0"	65' 0"	37' 0"	75' 0"	34' 0"	100' 0"	29' 0"	175' 0"	25' 0"	300' 0"	20' 0"	∞
100'	70' 0"	180' 0"	58' 0"	350' 0"	50' 0"	∞	40' 0"	∞	34' 0"	∞	26' 0"	∞
∞	220' 0"	∞	140' 0"	∞	100' 0"	∞	70' 0"	∞	50' 0"	∞	35' 0"	∞

DEPTH OF FIELD FOR 4 in. (100 mm.) LENSES ON 16 mm. CAMERAS

(For conversion into metric units see p. 110)

Scale set to	f 3.3		f 4		f 5.6		f 8		f 11		f 16	
	From	To	From	To	From	To	From	To	From	To	From	To
8'	7' 10"	8' 2"	7' 9½"	8' 2½"	7' 8½"	8' 3½"	7' 7"	8' 5½"	7' 5"	8' 8"	7' 2½"	9' 0"
9'	8' 9"	9' 3"	8' 8½"	9' 3½"	8' 7½"	9' 4"	8' 5½"	9' 7"	8' 3"	9' 11"	8' 0"	10' 4"
10'	9' 8½"	10' 3½"	9' 8"	10' 4½"	9' 6"	10' 6"	9' 4"	10' 9"	9' 1"	11' 1"	8' 9"	11' 8"
11'	10' 7½"	11' 4½"	10' 6½"	11' 5½"	10' 5"	11' 7½"	10' 2"	11' 11½"	9' 10"	12' 3"	9' 6"	13' 1"
12'	11' 6½"	12' 5"	11' 6"	12' 6½"	11' 3½"	12' 9"	11' 1"	13' 1½"	10' 8"	13' 7"	10' 3"	14' 6"
13'	12' 6"	13' 6"	12' 5"	13' 7½"	12' 2"	13' 11"	11' 10"	14' 5"	11' 5"	14' 11"	10' 11"	16' 1"
15'	14' 4"	15' 8½"	14' 2½"	19' 4"	13' 6"	19' 11"	12' 11"	20' 9"	12' 3"	22' 1"	11' 6"	24' 7"
18'	17' 1"	19' 1"	16' 11"	19' 4"	16' 6"	20' 0"	15' 11"	21' 9"	15' 3"	24' 1"	14' 2"	25' 7"
20'	18' 10"	21' 4"	18' 7"	21' 7"	18' 2"	22' 4"	17' 3"	23' 6"	16' 8"	25' 3"	15' 5"	29' 0"
25'	23' 4"	26' 11"	22' 10"	27' 8"	22' 2"	28' 11"	21' 0"	31' 0"	20' 0"	34' 0"	18' 3"	40' 0"
30'	27' 5"	33' 2"	27' 0"	34' 0"	25' 11"	36' 0"	24' 5"	39' 0"	22' 11"	44' 0"	20' 7"	56' 0"
40'	35' 6"	46' 0"	35' 0"	47' 0"	33' 0"	51' 0"	31' 0"	58' 0"	28' 0"	70' 0"	25' 0"	105' 0"
50'	43' 0"	60' 0"	42' 0"	62' 0"	39' 0"	69' 0"	36' 0"	82' 0"	33' 0"	107' 0"	28' 0"	225' 0"
70'	57' 0"	90' 0"	55' 0"	96' 0"	50' 0"	113' 0"	45' 0"	155' 0"	40' 0"	280' 0"	34' 0"	∞
150'	100' 0"	290' 0"	95' 0"	360' 0"	82' 0"	∞	69' 0"	∞	57' 0"	∞	45' 0"	∞
600'	300' 0"	∞	250' 0"	∞	180' 0"	∞	127' 0"	∞	93' 0"	∞	64' 0"	∞

DEPTH OF FIELD FOR 6 in. (150 mm.) LENSES ON 16 mm. CAMERAS

(For conversion into metric units see p. 110)

Scale set to	f 4		f 5.6		f 8		f 11		f 16		f 22	
	From	To	From	To	From	To	From	To	From	To	From	To
13'	12' 9"	13' 3"	12' 7"	13' 5"	12' 5"	13' 6"	12' 3"	13' 10"	12' 0"	14' 2"	11' 8"	14' 8"
14'	13' 8"	14' 4"	13' 7"	14' 6"	13' 5"	14' 7"	13' 2"	14' 11"	12' 11"	15' 5"	12' 5"	16' 1"
15'	14' 8"	15' 5"	14' 6"	15' 6"	14' 4"	15' 9"	14' 1"	16' 2"	13' 8"	16' 7"	13' 3"	17' 5"
16'	15' 7"	16' 5"	15' 5"	16' 7"	15' 2"	16' 11"	14' 11"	17' 3"	14' 6"	17' 11"	13' 11"	18' 6"
18'	17' 6"	18' 6"	17' 3"	18' 10"	16' 11"	19' 3"	16' 7"	19' 8"	16' 1"	20' 6"	15' 6"	21' 7"
20'	19' 4"	20' 8"	19' 1"	20' 11"	18' 9"	21' 6"	18' 4"	22' 1"	17' 7"	23' 3"	16' 8"	24' 7"
22'	21' 2"	22' 11"	20' 11"	23' 3"	20' 6"	23' 10"	19' 11"	24' 6"	19' 1"	26' 0"	18' 3"	28' 0"
25'	24' 0"	26' 0"	23' 6"	26' 7"	23' 1"	27' 3"	22' 4"	28' 5"	21' 3"	30' 0"	20' 3"	33' 0"
30'	28' 6"	31' 8"	27' 11"	32' 5"	27' 3"	33' 6"	26' 3"	35' 0"	24' 10"	39' 0"	23' 3"	42' 0"
35'	32' 11"	37' 4"	32' 3"	38' 4"	31' 1"	40' 0"	30' 0"	42' 0"	28' 1"	47' 0"	26' 0"	53' 0"
40'	37' 3"	43' 0"	36' 6"	44' 5"	35' 0"	46' 0"	33' 0"	49' 0"	31' 0"	56' 0"	29' 0"	66' 0"
50'	46' 0"	55' 0"	44' 6"	57' 0"	42' 0"	61' 0"	40' 0"	66' 0"	37' 0"	78' 0"	34' 0"	98' 0"
70'	62' 0"	80' 0"	59' 0"	85' 0"	56' 0"	94' 0"	52' 0"	107' 0"	46' 0"	140' 0"	41' 0"	226' 0"
100'	85' 0"	122' 0"	80' 0"	134' 0"	73' 0"	156' 0"	67' 0"	200' 0"	58' 0"	360' 0"	50' 0"	∞
200'	145' 0"	315' 0"	132' 0"	406' 0"	115' 0"	∞	100' 0"	∞	82' 0"	∞	67' 0"	∞
600'	540' 0"	∞	390' 0"	∞	275' 0"	∞	200' 0"	∞	137' 0"	∞	100' 0"	∞

DEPTH OF FIELD FOR $\frac{1}{2}$ in. (12.5-13 mm.) LENSES ON 8 mm. CAMERAS

(For conversion into metric units see p. 110)

Scale set to	f 1.5		f 1.9		f 2		f 2.8		f 4	
	From	To	From	To	From	To	From	To	From	To
9"	8 $\frac{1}{2}$ "	9"	8 $\frac{1}{2}$ "	9 $\frac{1}{4}$ "	8"	9 $\frac{1}{4}$ "	8"	9 $\frac{1}{4}$ "	7"	9 $\frac{1}{2}$ "
1'	11 $\frac{1}{8}$ "	1' $\frac{1}{4}$ "	11 $\frac{1}{8}$ "	1' $\frac{1}{4}$ "	11 $\frac{1}{8}$ "	1' $\frac{1}{4}$ "	11"	1' $\frac{1}{4}$ "	10"	1' 1"
1' 3"	1' 3"	1' 4"	1' 2"	1' 4"	1' 2"	1' 4"	1' 1"	1' 5"	1' 1"	1' 6"
1' 6"	1' 3 $\frac{1}{2}$ "	1' 8"	1' 3"	1' 9"	1' 8"	1' 10"	1' 3"	1' 9"	1' 2"	2' 0"
2'	1' 9"	2' 4"	1' 9"	2' 3"	1' 8"	2' 5"	1' 8 $\frac{1}{2}$ "	2' 7"	1' 6"	2' 10"
2' 6"	2' 2 $\frac{1}{2}$ "	2' 11"	2' 1"	3' 0"	2' $\frac{3}{4}$ "	3' 0"	2' 0"	3' 5"	1' 9"	4' 0"
3'	2' 8 $\frac{1}{2}$ "	3' 7"	2' 6"	3' 9"	2' 5"	3' 10"	2' 4"	4' 5"	2' 0"	5' 7"
4'	3' 4"	5' 2"	3' 1"	5' 7"	3' 0"	5' 9"	2' 9"	7' 0"	2' 6"	10' 2"
5'	3' 11"	7' 0"	3' 8"	7' 10"	3' 7"	8' 0"	3' 4"	10' 8"	2' 11"	21' 2"
6'	4' 5"	9' 3"	4' 3"	11' 0"	4' 1"	11' 0"	3' 7"	17' 0"	3' 1"	85' 0"
10'	6' 4"	24' 0"	5' 10"	38' 0"	5' 7"	45' 0"	4' 10"	∞	3' 11"	∞
15'	8' 0"	∞	7' 3"	∞	7' 0"	∞	5' 10"	∞	4' 7"	∞
20'	9' 2"	∞	8' 2"	∞	7' 11"	∞	6' 4"	∞	4' 11"	∞
30'	10' 11"	∞	9' 5"	∞	9' 0"	∞	7' 0"	∞	5' 4"	∞
60'	17' 1"	∞	13' 6"	∞	12' 11"	∞	9' 2"	∞	6' 5"	∞

DEPTH OF FIELD FOR $\frac{1}{2}$ in. (12.5-13 mm.) LENSES ON 8 mm. CAMERAS

(For conversion into metric units see p. 110)

Scale set to	f 5.6		f 8		f 11		f 16		f 22	
	From	To	From	To	From	To	From	To	From	To
9"	7"	9 $\frac{3}{4}$ "	6 $\frac{3}{4}$ "	10 $\frac{1}{4}$ "	6 $\frac{1}{2}$ "	1' 1"	6"	1' 4"	5 $\frac{1}{2}$ "	1' 9 $\frac{1}{2}$ "
1'	9 $\frac{1}{2}$ "	1' 1 $\frac{1}{2}$ "	8 $\frac{1}{2}$ "	1' 2"	8"	1' 3"	7 $\frac{1}{4}$ "	2' 8"	6 $\frac{1}{2}$ "	4' 7"
1' 3"	1' 0"	1' 8"	1' 0"	2' 0"	9"	2' 7"	8"	4' 6"	7"	∞
1' 6"	1' 1"	2' 2"	1' 0"	2' 8"	10"	4' 0"	9"	17' 0"	7 $\frac{1}{2}$ "	∞
2'	1' 5"	3' 6"	1' 3"	5' 1"	1' 1"	13' 0"	1' 0"	∞	9"	∞
2' 6"	1' 8"	5' 4"	1' 5"	10' 0"	1' 3"	∞	1' 2"	∞	8 $\frac{1}{2}$ "	∞
3'	1' 10"	8' 6"	1' 7"	46' 0"	1' 4"	∞	1' $\frac{1}{2}$ "	∞	10"	∞
4'	2' 2"	27' 6"	1' 10"	∞	1' 6"	∞	1' 2"	∞	9"	∞
5'	2' 5"	∞	2' 0"	∞	1' 8"	∞	1' 3"	∞	1' 0"	∞
6'	2' 7"	∞	2' 1"	∞	1' 8"	∞	1' 4"	∞	1' 1"	∞
10'	3' 2"	∞	2' 5"	∞	2' 0"	∞	1' 6"	∞	1' 2"	∞
15'	3' 7"	∞	2' 8"	∞	2' 0"	∞	1' 6"	∞	1' 3"	∞
20'	3' 8"	∞	2' 11"	∞	2' 1"	∞	1' 6"	∞	1' 3"	∞
30'	4' 0"	∞	3' 0"	∞	2' 2"	∞	1' 7"	∞	1' 4"	∞
60'	4' 7"	∞	3' 2"	∞	2' 5"	∞	1' 8"	∞	1' 4"	∞

DEPTH OF FIELD FOR $\frac{1}{4}$ in. (5.5 mm.) LENSES ON 8 mm. CAMERAS

(For conversion into metric units see p. 110)

Scale set to	f 1.8		f 2		f 2.8		f 4		f 5.6		f 8	
	From	To	From	To	From	To	From	To	From	To	From	To
$4\frac{1}{2}"$	4"	5"	4"	$5\frac{1}{2}"$	$3\frac{3}{4}"$	$5\frac{1}{2}"$	$3\frac{1}{2}"$	6"	$3\frac{1}{4}"$	7"	3"	$9\frac{1}{2}"$
5"	$4\frac{1}{2}"$	$5\frac{3}{4}"$	$4\frac{1}{4}"$	6"	4"	$6\frac{1}{4}"$	$3\frac{3}{4}"$	7"	$3\frac{1}{2}"$	$8\frac{1}{2}"$	$3\frac{1}{4}"$	1' 0"
6"	$5\frac{1}{4}"$	7"	5"	$7\frac{1}{4}"$	$4\frac{3}{4}"$	8"	$4\frac{1}{2}"$	$9\frac{1}{4}"$	4"	12"	$3\frac{3}{4}"$	1' 9"
8"	$6\frac{3}{4}"$	10"	$6\frac{1}{2}"$	$10\frac{1}{2}"$	6"	1' 0"	$5\frac{1}{2}"$	1' $3\frac{1}{2}"$	$4\frac{3}{4}"$	2' 1"	$4\frac{1}{2}"$	∞
1'	9"	1' 6"	$8\frac{3}{4}"$	1' 7"	8"	2' 1"	7"	4' 0"	$5\frac{1}{2}"$	∞	5"	∞
1' 6"	1' 0"	3' 1"	$11\frac{1}{2}"$	3' 6"	10"	7' 5"	$8\frac{1}{2}"$	∞	7"	∞	$5\frac{1}{2}"$	∞
2'	1' 2"	6' 4"	1' 1"	8' 5"	1' 0"	∞	$9\frac{1}{2}"$	∞	8"	∞	6"	∞
5'	1' 10"	∞	1' 8"	∞	1' 4"	∞	1' 0"	∞	$9\frac{1}{2}"$	∞	7"	∞
15'	2' 10"	∞	2' 7"	∞	1' 10"	∞	1' 3"	∞	11"	∞	8"	∞

DEPTH OF FIELD FOR 1 in. (25 mm.) LENSES ON 8 mm. CAMERAS

(For conversion into metric units see p. 110)

Scale set to	f 2.5-2.8		f 4		f 5.6		f 8		f 11		f 16	
	From	To	From	To	From	To	From	To	From	To	From	To
1' 6"	1' $5\frac{1}{2}"$	1' $6\frac{1}{2}"$	1' 5"	1' $5\frac{1}{2}"$	1' $4\frac{1}{2}"$	1' $7\frac{1}{2}"$	1' 4"	1' 8"	1' 4"	1' 9"	1' 3"	1' 11"
2'	1' $11\frac{1}{2}"$	2' 1"	1' $10\frac{1}{2}"$	2' $1\frac{1}{2}"$	1' 10"	2' $2\frac{1}{2}"$	1' 9"	2' 4"	1' $9\frac{1}{2}"$	2' 6"	1' 6"	2' 9"
3'	2' 11"	3' $2\frac{1}{2}"$	2' $10\frac{1}{2}"$	3' 5"	2' 7"	3' 6"	2' 6"	3' 11"	2' 4"	4' 4"	2' 1"	5' 4"
4'	3' 9"	4' 6"	3' 7"	4' 7"	3' 3"	5' 1"	3' 2"	5' 9"	2' 9"	7' 3"	2' 5"	12' 0"
5'	4' 7"	5' 9"	4' 5"	6' 2"	4' 0"	6' 10"	3' 7"	7' 9"	3' 2"	10' 3"	2' 9"	35' 0"
6'	5' 4"	7' 0"	4' $11\frac{1}{2}"$	7' 11"	4' 7"	8' 9"	4' 1"	11' 0"	3' 8"	16' 0"	3' 3"	66' 3"
10'	8' 1"	13' 0"	7' $2\frac{1}{2}"$	16' 0"	6' 6"	22' 0"	5' 8"	43' 0"	4' 11"	∞	4' 0"	∞
15'	11' 0"	23' 6"	9' 8"	31' 0"	8' 6"	60' 0"	7' 4"	∞	5' 8"	∞	4' 6"	∞
20'	14' 0"	40' 0"	11' 0"	90' 0"	10' 0"	∞	7' 11"	∞	6' 6"	∞	5' 0"	∞
25'	15' 9"	51' 6"	13' 6"	∞	11' 6"	∞	9' 2"	∞	6' 9"	∞	5' 3"	∞
∞	41' 0"	∞	26' 0"	∞	18' 0"	∞	13' 0"	∞	9' 4"	∞	6' 5"	∞

DEPTH OF FIELD FOR $1\frac{1}{2}$ in. (36 mm.) LENSES ON 8 mm. CAMERAS
(For conversion into metric units see p. 110)

Scale set to	f 2.8		f 4		f 5.6		f 8		f 11		f 16	
	From	To	From	To	From	To	From	To	From	To	From	To
1' 9"	1' 8 $\frac{1}{2}$ "	1' 9 $\frac{1}{2}$ "	1" 8 $\frac{1}{2}$ "	1' 9 $\frac{1}{2}$ "	1' 8"	1' 9 $\frac{1}{2}$ "	1' 8"	1' 10"	1' 7 $\frac{1}{2}$ "	1' 11"	1' 6 $\frac{1}{2}$ "	2' 0"
2'	1' 11 $\frac{1}{2}$ "	2' $\frac{1}{2}$ "	1' 11 $\frac{1}{2}$ "	2' $\frac{1}{2}$ "	1' 11"	2' 1"	1' 10"	2' 1 $\frac{1}{2}$ "	1' 9 $\frac{1}{2}$ "	2' 2"	1' 9"	2' 3 $\frac{1}{2}$ "
2' 3"	2' 2 $\frac{1}{2}$ "	2' 3 $\frac{1}{2}$ "	2' 2"	2' 4"	2' 1 $\frac{1}{2}$ "	2' 4 $\frac{1}{2}$ "	2' 1"	2' 5"	2' $\frac{1}{2}$ "	2' 6"	1' 11 $\frac{1}{2}$ "	2' 7 $\frac{1}{2}$ "
2' 6"	2' 5"	2' 7"	2' 4 $\frac{1}{2}$ "	2' 7 $\frac{1}{2}$ "	2' 4"	2' 7"	2' 3 $\frac{1}{2}$ "	2' 8 $\frac{1}{2}$ "	2' 3"	2' 9 $\frac{1}{2}$ "	2' 1 $\frac{1}{2}$ "	3' 0"
3'	2' 10 $\frac{1}{2}$ "	3' 1 $\frac{1}{2}$ "	2' 10"	3' 2"	2' 9 $\frac{1}{2}$ "	3' 2 $\frac{1}{2}$ "	2' 8 $\frac{1}{2}$ "	3' 4"	2' 7 $\frac{1}{2}$ "	3' 6"	2' 6"	3' 9 $\frac{1}{2}$ "
3' 6"	3' 4 $\frac{1}{2}$ "	3' 7 $\frac{1}{2}$ "	3' 3 $\frac{1}{2}$ "	3' 8 $\frac{1}{2}$ "	3' 2 $\frac{1}{2}$ "	3' 10"	3' 1 $\frac{1}{2}$ "	4' 0"	3' 0"	4' 2"	2' 10"	4' 7"
4'	3' 10 $\frac{1}{2}$ "	4' 2 $\frac{1}{2}$ "	3' 8 $\frac{1}{2}$ "	4' 3 $\frac{1}{2}$ "	3' 7"	4' 4 $\frac{1}{2}$ "	3' 6"	4' 7"	3' 4 $\frac{1}{2}$ "	4' 10 $\frac{1}{2}$ "	3' 2"	5' 6"
5'	4' 8 $\frac{1}{2}$ "	5' 4"	4' 7 $\frac{1}{2}$ "	5' 6"	4' 4 $\frac{1}{2}$ "	5' 8 $\frac{1}{2}$ "	4' 3 $\frac{1}{2}$ "	6' 1"	4' 0"	6' 7"	3' 8 $\frac{1}{2}$ "	7' 8 $\frac{1}{2}$ "
7'	6' 5"	7' 8"	6' 2 $\frac{1}{2}$ "	8' 0"	6' 0"	8' 6"	5' 7"	9' 5"	5' 2"	10' 8"	4' 8"	14' 0"
10'	8' 11 $\frac{1}{2}$ "	11' 5"	8' 6"	12' 2"	8' 0"	13' 5"	7' 3"	15' 8"	6' 8"	20' 0"	5' 10"	37' 0"
15'	12' 7 $\frac{1}{2}$ "	18' 7 $\frac{1}{2}$ "	11' 10"	21' 0"	10' 10"	24' 4"	9' 8"	34' 0"	8' 6"	63' 0"	7' 2"	∞
30'	21' 7"	49' 0"	19' 0"	68' 0"	17' 0"	138' 0"	14' 3"	∞	11' 1"	∞	9' 5"	∞
200'	75' 10"	∞	53' 0"	∞	38' 0"	∞	27' 0"	∞	19' 0"	∞	13' 0"	∞

It will be seen that the depth of field on lenses of short focal length, even when working at full aperture, is sufficient to allow you to estimate the subject distance when it is farther away than 5 ft. When you are operating with the subject closer to the camera than 5 ft. you should always focus the lens with the critical focusing screen or a tape measure. Always use the critical focusing screen when using a telephoto lens.

Bear in mind that although the great depth of field provided by wide angle and 1 in. lenses may permit a rough estimate of the subject distance you should always try to get the most important feature of your subject as sharp as possible.

The Depth of Field Tables

The tables on pp. 65-78 give the actual depth of field in feet and inches for the various cine lenses on the 16 mm. and 8 mm. cameras.

The figures for the 16 mm. camera are based on a circle of confusion of $1/30$ mm. in the image, those for the 8 mm. cameras on a circle of confusion of $1/50$ mm. All distances are measured from the focal plane of the camera.

To find the depth, look up the appropriate table, and trace horizontally from the distance on the focusing scale to the double column corresponding to the aperture used. The two columns headed "from" and "to" then show the near and far limits of the depth of field.

SPECIAL EFFECTS WITH THE BOLEX

Bolex H.16 and H.8 cameras are admirably suited for the production of so-called trick effects. It should first be pointed out that trick effects should only be employed in a film as a means to an end and should never be treated as the main subject material, unless of course you are practising and experimenting with the versatility of the Bolex.

Reverse Motion

The first special effect that you will want to try is the most simple of them all to carry out.

Basically, all reverse motion effects are obtained by operating the Bolex upside down. When the film has been processed, the inverted scenes are cut out and replaced the right way round for projection. It will appear that everything in these scenes is moving backwards.

The method that offers more scope for serious work is that of filming with the camera held upside down but planning the action of the film backwards. For instance, a most realistic car accident can be created if carefully staged with every action taking place in reverse order.

This is how it can be done. Arrange for an actor to lie on the ground as close to the radiator of a car as possible, rise to his feet with his arms in front of his face as though to protect himself then lower his arms. At the same time have the car reverse away from him at the fastest speed possible until it is out of the field of view.

When this scene is projected the other way round it will appear that the car drives at high speed towards the pedestrian, and knocks him down.

Another example that illustrates the technique is to show a hand holding a cloth, wiping a pane of glass. The glass suddenly becomes smeared, then covered with a white substance in which are written the words "How was it done?"

The answer to this question is equally simple. Coat a
80 sheet of glass with metal polish and write with your finger

on the dried polish. Then film with the Bolex upside down and have someone slowly clean the glass.

When using the H.8 camera it must be remembered that the perforations are on one side of the film only. When the film is turned end to end it will be necessary to join the base side of one strip of film to the emulsion side of the other in order to match up the perforations. When projecting the spliced film, a slight focusing adjustment will be necessary and the scene will appear left to right.

The same thing will apply if single perforated film is used in the H.16 camera.

Slow Motion

The effect of slow motion is obtained by setting the speed control at 48 or 64 f.p.s., then filming the subject in the normal way. This method will be found most useful if you are filming a sports event.

The reason for this illusion of slow motion is based on the fact that during a scene lasting 5 sec., the camera will run, at 64 f.p.s., a length of film that will take 20 sec. to project at the normal speed of 16 f.p.s. The action is therefore spread out over 20 sec. during projection.

When the camera is running at a faster speed than 16 f.p.s. it will be necessary to adjust the lens aperture to allow for the shorter exposure of the film (p. 56).

Speeded and Time Lapse Photography

If you set the speed control to 8 f.p.s., all motion on the screen will appear to move at twice its original speed. This causes quite an amusing effect if a busy street corner is filmed during the rush hour.

Once again a lens aperture adjustment must be made. This time the aperture must be one stop lower than was required when filming at 16 f.p.s.

The use of the single shot release will produce true time lapse results. If a single shot is exposed every second the motion on the screen will be speeded up 16 times. Any length of time can be allowed to lapse between the exposure 81

of single shots and therefore, movement lasting some hours can be condensed into a few minutes of film.

You can produce a most unusual sunrise by mounting the Bolex on a tripod and aiming towards the east. As soon as the sun begins to appear over the horizon expose a single shot every 2 sec. (preferably by means of the cable release described on p. 91), until the sun is fairly high in the sky. The original sunrise may have taken 15 min. but your sunrise on the screen will last just 30 sec.

Time lapse photography has allowed the scientist to study in detail the growth of a plant, the action of acid and many other processes which would normally take hours of observation.

Animation

The many maps that were used during the war on the cinema screen to indicate the movement of troops gave an excellent illustration of the simple animated film. The technique employed is exactly that used to produce time lapse effects.

You can produce a similar device to liven up your travel films by filming a map of the area concerned for a few seconds, stopping the camera and then adding the line of your route little by little, exposing a single shot for every small addition. Arrows or other symbols can be introduced and if the single shots are carefully timed, the illusion of the lines and arrows forming themselves will appear when the film is projected.

Animated cartoon films are dependent upon the skill of the camera operator as an artist. Providing you have the necessary talent and patience, this fascinating subject can be explored by means of the single shot release.

Fades

The fade is used in the production of a film to prevent abrupt cuts between one scene and the next.

82 The picture on the screen appears to fade away until it

becomes completely black. The next scene is faded in from a black screen to normal appearance. These two phases are known as a fade-out and a fade-in. Both effects are easily obtained on the Bolex camera by reducing or increasing the exposure at the end or the beginning of a shot. A fade should last about 3 seconds.

This can be done in several ways. The most satisfactory is by the use of the fading diaphragm (described on p. 90). To produce a fade-out, shoot the scene in the normal way and then slowly close the special diaphragm until all light is excluded from the lens. To fade the picture in again, start the camera, then slowly open the special diaphragm to its maximum extent.

Another method is to employ the matte box (described on p. 98), and a piece of glass that has been carefully sprayed with black paint so that it passes from absolute transparency at one end, to an opaque black at the other end.

To produce a fade-out with this equipment, mount the matte box on to the camera and insert the transparent side of the glass in one edge of the matte box.

Film the scene in the normal way and then slowly slide the sprayed glass through the matte box, across the lens until the opaque end excludes all light from the lens. To produce a fade-in simply reverse this process.

There is a method that does not entail the use of any extra accessories although it is a little more difficult to produce and not quite so satisfactory as the methods just described. A fade-out is obtained at the end of the scene by closing the iris diaphragm on the lens to its lowest stop and then cupping the hand over the lens cap. To fade-in, cup the hand over the lens cap, start the camera and open the lens aperture slowly until the correct stop is reached. On a lens fitted with click stops this is easy to do.

Superimposition

It is possible with careful planning and imagination to make titles or shots that appear to be superimposed on another scene in the film.

This is done by setting the frame counter to zero before shooting the required scene and noting the amount of exposed film measured by the footage indicator. At the completion of the film, before the trailer is allowed to pass through the camera, the lens cap is put on and the film wound back until the pre-selected scene is reached and the first frame of the scene is indicated by the frame counter. The camera is then mounted on a titler and the titles exposed on the same length of film that was used for the original scene.

This technique can also be used to produce ghost effects.

Lap Dissolves

A lap dissolve consists of a fade-out on top of a fade-in.

This effect is produced by fading out the scene as described above and measuring with the frame counter the length of the fade. The lens cap is then put on and the film wound back through the camera until the frame counter indicates that the beginning of the fade has been reached. The film is then run through the camera again and the next scene faded in on top of the existing fade-out.

A lap dissolve produces the smoothest possible transition of one scene to another.

Mattes

A matte consists of a cut-out shape, e.g. a key hole, a heart, a circle, two linked circles resembling the eye-pieces of binoculars, or any other appropriate shape placed in a box in front of the camera lens. A scene filmed with a matte in position will give the impression of your subject viewed through a key-hole or any of the other shapes.

Split Frame Exposures

This effect can only be produced if the Bolex camera
84 incorporates or has been modified with the filter slot men-

tioned on p. 16. Two thin shims of metal are required that will fit into the filter slot. One should be designed so that it obscures exactly half the frame width on one side of the gate and the other so that it obscures exactly the other half of the frame.

To produce a split screen effect of one man enjoying an argument with himself, insert one of the shims in the filter slot, set the frame counter to zero and position the subject in one half of the field of view, bearing in mind the fact that if the left-hand half of the frame is obscured by the shim the subject must appear in the left-hand half of the field of view. This is necessary because the image is turned upside down and reversed left to right on the film.

Having exposed a sufficient length of film, remove the shim, place the other in position so that the side of the frame first exposed is now obscured. Put on the lens cap, and wind the film back through the camera until the footage Indicator registers zero. Move the subject to the other side of the field of view and re-shoot the same length of film as for the first scene.

BOLEX ACCESSORIES

The versatility of the Bolex camera can be greatly extended by the addition and use of the numerous accessories produced by the makers.

The following instruments and attachments are all precision made and you should experience no difficulty when you fit them to your camera.

They are not listed in any particular order for their degree of importance depends solely on the specific task you have in hand.

The Eye-Level Focusing Attachment

This accessory has been designed to allow the camera operator to use the critical focusing screen from the rear of the camera instead of from the rather inconvenient top position. This means that you can focus accurately by bringing the required lens into position in front of the critical focusing screen, and shifting the eye from the rear of the viewfinder to the rear of the eye-level focusing attachment.

Apart from this advantage the eye-level focusing attachment reproduces the exact frame of view given by the lens, whereas the critical focusing screen when used alone, produces a circular image that cuts off the corners of the frame.

With an eye-level focusing attachment on your camera you will make full use of the critical focusing screen and will find it particularly useful when you use telephoto lenses or fast lenses at full aperture.

You can also use the focusing screen to keep a check on the depth of field obtained with any lens. But remember that even though the image is magnified ten times it is still very small compared with the size of the projected picture. The apparent sharpness of objects near the limits of the depth of field zone may be deceptive when viewed on the focusing screen.

The eye-level focusing attachment is available for H.16 and H.8 cameras and is fitted to both in the same way. Series II, III and IV cameras are fitted with clamps designed to hold the tri-focal viewfinder. The viewfinder should be placed in the side position (on the camera door) and the tri-focal clamps removed by unscrewing them. These clamps should be replaced by the two special mountings supplied with the eye-level focusing attachment. Series V and VI cameras will have the special mountings already fitted and will not require any adjustment.

Using the Eye-Level Focusing Attachment

1. Change magnifying lenses.
2. Fit attachment to camera.
3. Unscrew dust cover.
4. Adjust eye-piece.
5. Focus subject through lens.
6. Set lens for filming.

1. Unscrew the magnifying lens of the critical focusing screen. This is situated in the upper front part of the camera body. Then replace it with the special cover glass supplied with the accessory.
2. Slide the eye-level focusing attachment on to the mountings so that the aperture in the bottom at the front of the instrument covers the magnifying lens of the critical focusing screen.
3. Unscrew the dust cap from the front of the critical focusing screen, as for normal use.
4. Before placing a lens in front of the critical focusing screen, adjust the eye-level focusing attachment to suit your eyesight. Turn the milled knob on the side of the tube until the grain of the ground glass surface of the prism is seen in sharp focus when the camera is pointed towards the light.

This adjustment remains constant whatever the lens in use. It need only be altered if the operator's eyesight changes.

5. The attachment is now ready for use. Screw a lens into the turret and swing it in front of the critical focusing screen, open the lens aperture to its maximum stop and bring the subject into sharp focus by rotating the focusing ring on the lens.
6. Return the turret to bring the lens into the operating position and set the aperture for filming.

The eye-level focusing attachment is provided with three adjusting screws that will correct the image if it appears off-centre or incomplete. These are found under the metal cap at the forward end of the barrel.

Vertical adjustments can be made by turning the upper of the three screws. For horizontal adjustments turn either of the lower screws.

The Turret Handle

This accessory fixes on to the turret of the camera and allows it to be revolved without any handling of the lenses. The use of a turret handle will eliminate any risk of the lens settings being accidentally disturbed as the turret is swung. It is provided as standard equipment on Series VI and VII cameras.

To fit the turret handle, remove the screw from the turret pivot spindle, and remove the plated cap and the spring found under it.

Place the hole in the handle plate over the turret pivot spindle. Replace the original spring and put on the new cap that is supplied

with the handle. Finally screw home the screw into the turret pivot spindle.

The turret handle is designed so that it may be folded up alongside the lenses in the turret when not in use.

The Gate Focusing Attachment

This consists of a prism and a magnifying lens that is inserted into the gate of the camera in place of the pressure pad. It enables the operator to view the subject to be filmed directly through the taking lens when this is in the operating position. This method permits great accuracy when focusing and framing a subject at close range.

The camera should be mounted on a tripod or a titling bench so that once it is adjusted and the lens focused, it can be locked in position.

To use the gate focusing attachment:

1. Remove pressure pad and replace by attachment.

2. Open shutter.

3. Adjust and focus camera.

4. Lock camera, and load with film.

1. Remove the pressure pad from the gate by lifting the pin from one end and removing the screw from the other end. Replace the pressure pad with the gate focusing attachment.

2. Disengage the camera motor by placing the clutch lever on to "O". Push the continuous release control on to position "M" and open the shutter by using the hand cranking handle.

3. Adjust the camera for the right field of view and focus the lenses with your eye to the plastic eye-piece.

4. Lock the camera in position and remove the gate focusing attachment. Replace the pressure pad and load the camera with film.

The gate focusing attachment is intended to be used before the camera is loaded. If you require to use it when a partially exposed film is in the camera you must first wind back the film on to the feed spool as described on p. 36.

Some adjustment for individual eyesight can be obtained by the experimental use of the packing ring below the plastic eye-piece.

The Pistol Grip

This device enables the camera to be held with great stability. It is fitted with a trigger that, when pressed, releases the starting button on the front of the camera. The unit is secured to the base of the camera by a screw found in the top side of the plate (see also p. 38).

A good method of holding the Bolex when the pistol grip is used is to place the viewfinder in the side position and grasp this with the left hand. The shaped handle of the pistol grip can then be held by the right hand and the trigger squeezed by the index finger.

BOLEX ACCESSORIES

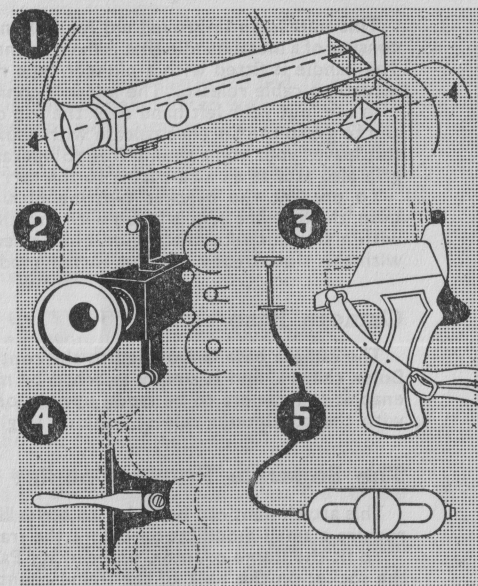
1. The eye-level focusing attachment permits accurate focusing through the critical focusing screen with the camera held in shooting position (p. 86).

2. The gate focusing attachment fits into the gate in place of the pressure pad, to show the exact field and focus for close-ups (p. 88).

3. The pistol grip provides a specially steady hold on the camera (p. 88).

4. The turret handle allows the turret to be rotated without handling the lenses themselves (p. 87).

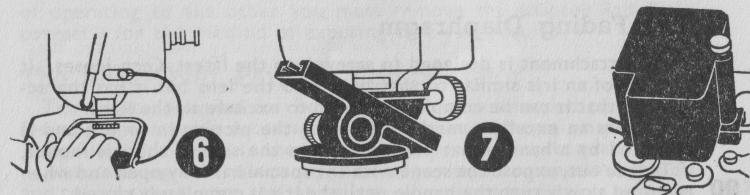
5. The cable release helps to reduce vibration (p. 91)



6. The Surefire grip is an alternative to the pistol grip for holding the camera steady. It incorporates a cable release (p. 90).

7. The rack-over parallax compensator adjusts the camera position by a fixed amount so as to bring the lens and the eye-level finder alternatively in exactly the same position (p. 92).

8. The electric driving motor is useful for filming scenes which require a longer continuous run than 19 ft. (which is the limit of the spring motor) (p. 92).



The Surefire Grip

This unit is an improved aid for holding the camera really firm. It consists of a metal handle that is fixed to the tripod socket of the camera. The handle is fitted with a plunger type release, which when pressed, actuates a cable release. The latter is connected to the release button.

In use, put your left hand over the top of the Bolex under the strap, and to grasp the Surefire release with your right hand, palm facing left; this leaves your right thumb free to operate the plunger. The Surefire grip also acts as an alternative to the carrying strap.

To prevent the bracket twisting or unscrewing from the camera bush, the Surefire grip is fitted with a small projecting lug which locates with a slot cut into the tripod bush. Series VI cameras are supplied with this slot already cut, but earlier models can be easily modified.

Camera Base

The camera base is moulded to the contours of the underside of the Bolex camera, and is simply attached by means of the tripod bush. It enables the camera to be stood upright on a flat surface when filming with the continuous release, making single frame exposures, etc.

The Separate Frame Counter

This attachment can be added to series III cameras. Series II cameras require a small modification before the frame counter can be fitted.

To fit the frame counter, unscrew its Paillard-Bolex name plate. Fit the socket on the back of the frame counter on to the hand cranking spindle. Insert the two screws into the holes on the frame counter and position it so that screws drop into the sockets for the name plate. Screw on tightly and then check by using the hand crank, that the mechanism works freely.

The frame counter will protrude so far from the camera body that only the special winding handle supplied or the key-type handle can be used to wind the camera motor.

For full details of frame counter readings, see p. 15.

The Fading Diaphragm

This attachment is designed to screw into the latest Kern lenses. It consists of an iris similar to that built into the lens but it has the advantage that it can be completely closed to exclude all the light.

It offers an excellent method of fading the picture in or out and is operated by a handle that protrudes from the side of the iris mount.

To fade out, expose the scene with the special iris fully open and when required slowly turn the handle until the iris is completely closed.

To fade in, begin exposing with the special iris completely closed and then slowly turn the iris handle until fully open.

The Cable Release

Bolex cable releases are available in two lengths, 40 and 18 in. (100 and 45 cm.). They allow the camera to be operated without vibration.

With the release it is possible to move away from the camera when the scene is being filmed. This is useful when for instance, a child is being filmed in close up. The camera can be lined up, the lens focused and then the exposure made in a very inconspicuous fashion.

If the camera is used to produce an animated film a great deal of time and effort will be saved by clipping on a release of appropriate length and exposing each single frame from the subject position.

To fit a cable release for continuous filming:

1. Set release control to "STOP".
2. Screw release into adaptor.
3. Set adaptor to "P".
4. Fit to camera.
5. Release motor with cable to film.

1. Set the control knob on the side of the camera on "STOP".
2. Hold the release adaptor so that the letters "M-P" correspond to the same letters engraved on the camera. Then screw the release into the extreme end of the adaptor marked "P".
3. Slide the milled knob on the adaptor along to "P" and turn it so that the line across its surface is horizontal.
4. Place the adaptor over the camera control, press on the milled knob and turn it to bring the line to the vertical position.
5. The camera motor will now start when the knob at the end of the release is pressed and stop when pressure is released.

For single shots the same procedure is followed except that the release is screwed into the end of the adaptor marked "M" and the milled knob pushed along the adaptor to "M".

The cable release will not work correctly if the adaptor is placed over the camera control upside down. If you change from one method of operating to the other you must remove the adaptor and fit it correctly for the method of exposing that you require.

The Rack-Over Parallax Compensator

This device designed for Bolex H cameras is intended to simplify focusing and provide accurate centering when extreme close-ups are being filmed. It fits on to the tripod platform or the top of a table.

After moving the camera on the wedge-shaped compensating slide and rotating the turret, the taking lens, when used for filming, occupies

exactly the same position as it did when focusing through the eye-level focuser. Any discrepancies due to parallax error are thus avoided.

The Electric Motor

The motor, which is powered by dry batteries, permits uninterrupted filming at speeds of 8, 16, 24, and 32 f.p.s. on all H.16 and H.8 models. The power unit is complete and housed in a carrying case.

It is secured to the camera so that the motor spindle engages with the hand cranking shaft. The clutch lever is placed on "O" to free the film transport mechanism, and a plastic collar piece is attached to the speed control so that it can be operated from behind the motor.

The motor is suitable for A.C. or D.C. current and is supplied with five 6-volt batteries. Two are required to drive the H.16 at 8 f.p.s., three for 16 f.p.s., four for 24 f.p.s. and all five for 32 f.p.s.

With the H.8 two batteries are required for 16 f.p.s.—8 f.p.s. cannot be obtained, nor can the speed be increased above 48 f.p.s.

A transformer is available for working directly from A.C. mains. It has voltage and frequency selectors for the mains supply (range 90 to 300 volts), and an output voltage regulator for speed control.

The Paillard-Bolex Titler

The cine film without sound will require titles that introduce it and explain it as it proceeds. These titles are easy to produce if the Bolex camera is used in conjunction with the titling bench made for it. The titler is designed to employ many accessories that fit in with facilities provided by the camera.

The titler is an optical bench formed by two tubes, the first of which acts as a sliding mount for the camera cradle and the other as a guide rail for the cradle in either of its two positions.

The camera cradle works on the principle of the alignment gauge so that the camera can be exactly centered on the title to be filmed.

At the working end of the optical bench there is a stand for titling frames and accessories, and a reflector mounting frame.

Lighting and Accessories

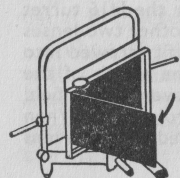
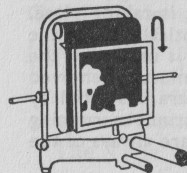
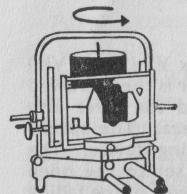
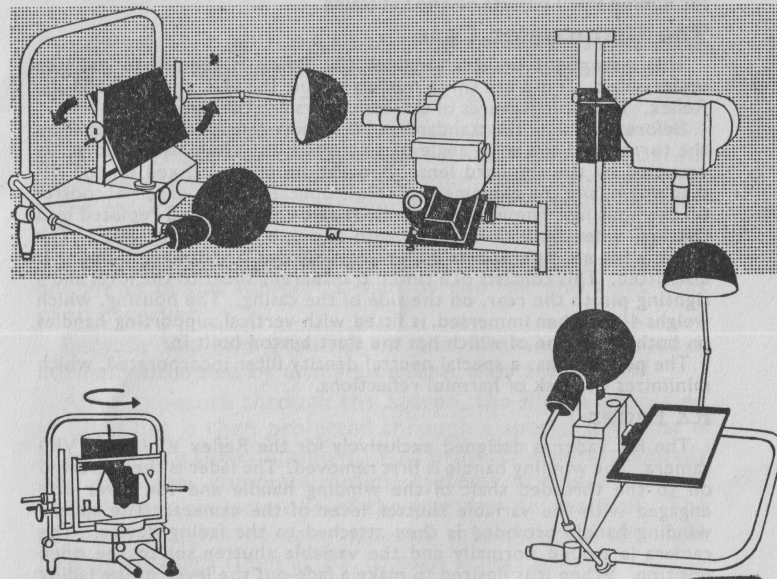
The reflectors consist of two lighting units designed to illuminate the title and background. They are held by movable arms which can provide unlimited lighting effects.

The titling frames allow a large number of drawings, title cards and small objects to be combined so that they appear super-imposed on the film.

The accessories are a drum, a turntable, a tilting plate, a file-past background, a mirror, a semi-ground glass plate and several others.

The titler is designed for letters made of felt or cork with a felt backing. These will adhere to the velvet cloth with which the accessories are covered. Letters are supplied by Paillard in sizes 10 or 15 mm. high, in white, yellow, red and green.

THE BOLEX TITLER



The Bolex titler is complete with two lighting units (top). It can be used in a horizontal or vertical position. The latter is ideal when you want to film small objects such as coins. The guide rails keep the camera accurately aligned and centered on the middle of the title area. The camera cradle is designed on the principle of the alignment gauge so that the title can be exactly centered in the film frame before it is filmed.

With the help of suitable accessories (left), the Bolex titler enables super-imposed titles to be filmed together. A wide variety of effects can be produced in this way. The running title device is ideal for filming a long title with a large number of words. The flip-over accessory provides titles that change like the pages of a book that are being turned.

The titler can be used horizontally or vertically. The latter is useful for filming small objects on the flat frame.

The Underwater Case

This watertight housing enables the Bolex H camera to be used underwater. There are three models to suit the H.8, the H.16 and the Reflex. The basic features of the containers are the same.

Before insertion, the standard and telephoto lenses are removed from the turret, and the wide angle lens screwed into the position normally occupied by the standard lens. A collar supplied, is fixed on the iris diaphragm, and the movement of this is operated by an external control on the housing. The winding handle is also removed, and replaced by a toothed wheel, which engages with the special winding gear. The housing has a simple sports finder and a special "iconometer" finder is also fitted. This consists of a tinted transparent sheet to the fore, and a sighting pin to the rear, on the side of the casing. The housing, which weighs $4\frac{1}{2}$ lb. when immersed, is fitted with vertical supporting handles on both sides, one of which has the start button built in.

The porthole has a special neutral density filter incorporated, which minimizes the risk of harmful reflections.

RX Fader

The RX Fader is designed exclusively for the Reflex VS (Series VIII) camera. The winding handle is first removed. The fader is then screwed on to the threaded shaft of the winding handle and the lever arm engaged with the variable shutter lever of the camera. The special winding handle provided is then attached to the fading device. The camera is wound normally and the variable shutter set to the open position. When it is desired to make a fade-out the lever of the fading device is pressed. This automatically closes the shutter and produces a fade-out. Pressure should not be relaxed while this is taking place. When the shutter is closed the fading device automatically stops the camera. For a super-imposition, the backwind handle is used with the lens cap in place and the clutch disengaged. The lens cap must be removed and the clutch re-engaged before fading-in. The camera is started by pressing the Reflex fader lever after setting the continuous running lock. The fader ensures that the fade-in and fade-out are always of the same length and regularity.

Wide Screen Attachment (Moller Anamorphot)

This is a wide screen attachment and is designed for the H16 turret head models. Only the standard lens can be used, the other two lenses are removed and the two supporting posts for the outfit screwed into the lens mounts. The anamorphic lens increases the width of the picture to twice the height and a special viewfinder covering this field is supplied with the outfit. The same lens is used for projection. When ordering the Anamorphot, see that the adaptor supplied with the lens is suitable for the particular Bolex model.

THE BOLEX STEREO

This attachment is designed to produce stereoscopic films when used in conjunction with the Bolex H.16 camera.

The Stereo employs two Kern lenses mounted 5.3 mm. apart, two prisms extend the optical path to a separation of $2\frac{1}{2}$ in. The lenses are of the fixed focus type; $\frac{1}{2}$ in. (12.5 mm.) focal length and with maximum apertures of $f2.8$. Light passing through these lenses is reflected by prisms so that the two lenses produce separate images, side by side on the normal film frame. The twin images represent the different views of the subject as seen by the left and right eyes of an observer.

Because the two pictures on the film share the space normally occupied by a single picture, they are vertical.

After exposure through the Stereo, the film is processed as usual but is then projected through a special lens that is supplied with the equipment. This projection lens is actually two separate, complete optical systems arranged so that each system projects one of the pictures on the film. The separate systems contain material that polarize the light passing through them at 90° to each other.

Two types of projection lenses are produced by Paillard. One is designed for the Paillard Bolex Type G projector and the other suits the majority of recent American and British projectors. The latter lens is fitted with two adjustment knobs, one for vertical alignment of the two images and the other for focusing them.

The Type G Stereo projection lens is designed so that it orientates itself in the lens holder and ensures correct alignment of the images. Focusing is carried out with the usual projector knob.

When the audience put on the spectacles provided they will immediately see the scene with a definite three-dimensional appearance. This effect is produced because the spectacle lenses are also polarized so that each eye sees only the view that was filmed by the corresponding stereo lens.

Fitting the Stereo to the H.16

The attachment is fitted with a ring that screws into the centre aperture of the Bolex turret.

When the Stereo is placed in position it obstructs the field of view of the Octameter viewfinder. To overcome this a metal bracket is provided to extend the viewfinder away from the side of the camera.

The vertical-shaped mask is slipped on to the front of the viewfinder and the Stereo is ready for action.

Making Stereo Films

Three-dimensional films do not require a special filming technique. To make full use of the three-dimensional effect, remember that objects in the foreground will appear to be separated by greater distances than far away objects.

For this reason you should try to compose your subject so that the foreground contains three or four separate planes of interest.

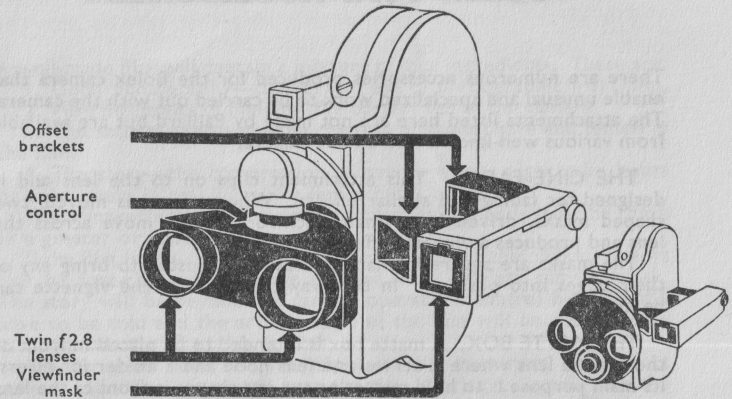
The shadows produced by side lighting also strengthen the stereoscopic effect. For this reason some departure from the conventional flat, frontal lighting for colour film (p. 106) is possible in stereo work.

You can use reverse motion too. The fake car accident described on p. 80 will provide a very dramatic result. With your Bolex used upside down and the Stereo on the turret, have a car driver reverse his vehicle at high speed away from the camera.

From a photographic point of view the only unusual thing about the Stereo are the fixed focus lenses. Their very short focal lengths provide great depth of field, at $f/8$ the depth would extend from about 2 ft. to infinity.

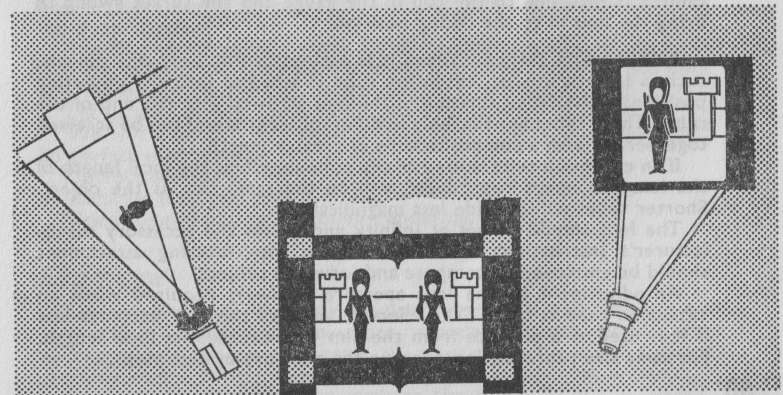
A special close-up stereo attachment is available which must be fitted by a Bolex workshop. It consists of a circular metal plate containing two sets of prisms. The first set permits stereo filming at distances of 28 in. to 7 ft., the second set provides a focusing range from 18 to 34 in.

THE BOLEX STEREO



The stereo attachment screws into the centre aperture of the Bolex turret and produces two images, side by side, on the film. These images are the same as those seen by the left and right eyes. A special close-up stereo attachment (right) is available for near subjects.

The special projection lens projects the two pictures on to the screen through polarizing filters. The naked eye will then perceive them slightly out of register. When the audience wear polarizing glasses supplied with the outfit, they see a very realistic three-dimensional image.



BOLEX TYPE ACCESSORIES

There are numerous accessories produced for the Bolex camera that enable unusual and specialized work to be carried out with the camera. The attachments listed here are not made by Paillard but are available from various well-known instrument makers.

THE CINE FADER. This attachment clips on to the lens and is designed for fading and similar effects. When a lever is moved, two shaped masks, driven by a small clockwork motor move across the lens and produces a vignette effect on the film.

The masks are square in shape and can be adjusted to bring any of their edges into position. In this way the shape of the vignette can be altered.

THE MATTE BOX. A matte box is intended to be placed in front of the camera lens where it serves as a lens hood and a holder for filters. Its main purpose is to hold mattes or cut-out shapes in front of the lens so that they record on the film.

THE ALIGNMENT GAUGE. A gauge of this type is designed to permit accurate composition and focusing of close-up shots once the camera is loaded with film. It is used in conjunction with the critical focusing screen and eye-level focusing attachment on the camera. The alignment gauge enables the camera to be lowered down a slope so that the lens in the focusing position occupies the normal taking position. When focusing and composing has been completed the camera is returned to the top of the gauge and the turret swung to bring the lens in to the taking position.

EXTENSION TUBES. When it is desired to film very tiny objects, such as insects, etc., an extension tube is screwed into the operating position of the Bolex turret and the lens screwed into the end of the tube. These tubes are available in different lengths and can be screwed together to form a composite tube of greater length.

If an extension tube is used of the same length as the focal length of the lens the image reproduced will be the same size as the object. Shorter tubes will provide less magnification.

The lens should be set at infinity and unless the accessory manufacturer's instructions are followed, the gate focusing attachment should be employed to compose and focus the subject.

An adjustment to the lens aperture is always required when an extension tube is used. The effective value of the lens becomes less if it is used at a distance from the film that exceeds its focal length. For same size reproduction open up the aperture by two stops.

MOTION PICTURE TECHNIQUE

A well-made film will contain a mixture of four ingredients. These are:

1. Good photography—the correct use of photographic principles.
2. Pure mechanics of filming—the correct use of the camera.
3. The artistic approach—the creation of atmosphere and tempo in the film.
4. The story—the compression of events which might take hours or even weeks in real life into a few minutes of film.

These ingredients can be varied in quantity but each must be there in a greater or lesser degree.

If the film is one dealing with a scientific subject the obvious factors will be first-class photography coupled with flawless camera work. The story will be beyond the camera operator's control but will still have to be told and the artistic value of the film will be present only as a by-product of the other factors.

On the other hand the film might set out to portray an abstract subject and when completed bear the title "Spring". In this case the artistic approach to the subject will be of great importance. The ideas of atmosphere, tension and continuity must be formed in the mind even before the camera is loaded with film. Good photography and the mechanics of filming now serve as aids to the person producing the film, aids that will assist him to record his ideas and impressions on to film so that others may enjoy and share them with him.

In a film where the story is of prior importance every other factor must be used to assist in telling the story. Any digression for the sake of trick photography or artistic production for its own sake will leave the audience trying to piece the story together long after the film has been shown.

The four essential ingredients for the production of a worth-while film can be split up into separate points that should be practised until they become a natural part of the complete technique.

Let us take each of these points one by one and explore them.

We will deal first with good photography. The things which lead to perfect photographic results are:

- Correct exposure,
- Accurate focusing, and
- Good tone rendering or colour rendering.

Exposure

Correct exposure is a basic essential in any film and although we have those two assistants exposure latitude and compensated processing to help correct our errors, we must stress the fact that there can only be one correct exposure setting for any shot that is filmed.

We can either estimate or measure the brilliance of the subject.

The latter method will usually produce a higher percentage of successful results than will estimation. Use an exposure meter whenever possible for every shot. A meter will not guarantee success but it will cut down the risk of a mistake.

We have only two methods of controlling the exposure that the film receives. One is by setting the lens aperture and the other by adjusting the camera speed control. Our task is simplified because the camera speed is primarily used to control the speed of the motion on the screen and we are left with only the lens to adjust.

When you are using a combination of three lenses on your Bolex do not forget to set each of these to the same aperture. This should always be done before you start to film because even though you may have decided to use only one lens, you may, without thinking, switch from one to the other in the middle of a shot.

Focusing

The still photographer who specializes in portraiture can show us the value of selective focusing. When making a picture of the "head and shoulders" type, he will focus on the eyes and leave the rest of his subject to take care of itself.

We can never have this degree of control over focus because the depth of field of a normal cine lens is so great. There are, however, ways in which we can emphasize certain parts of our subject.

For instance, our subject may be a person seated in a deck-chair 15 ft. from the camera. The foreground is a lawn but the background is a mass of confusing objects, a fence, a shed, etc. We find that we require a lens aperture of f 5.6 and learn from our depth of field indicator on the lens that the depth extends from 6 ft. to infinity if we focus on our subject (15 ft.) at this lens setting. The result will show our subject and the miscellaneous background all equally sharp and we will have difficulty sorting out one from the other.

The depth of field indicator also shows that if we focus our lens at 7 ft. the depth will then extend from 4 to 18 ft. The result in this case will give us a perfectly sharp foreground that will not matter as it is only grass and our figure in the deck-chair will also be in focus. Anything in the background will be out of focus and pleasantly diffused.

By all means get the main point of interest in the scene pin-sharp but try to diffuse incidental objects so that they do not intrude too much.

Using a Focusing Zone

We can make use of depth of field by setting our lenses at the point where they will provide the greatest depth at any lens aperture. This will allow a person in the scene to move backwards and forwards within the prescribed zone (which can be marked on the ground with white chalk), without making a focusing adjustment necessary.

FOCUSING ZONES
(For conversion to metric values see p. 110)

Aperture	Depth of Field Zone (Ft.) with		
	$\frac{5}{8}$ in. (15-16 mm.) Lens on H.16 Focus on 10 ft.	1 in. (25 mm.) Lens on H.16 Focus on 15 ft.	$\frac{1}{2}$ in. (12.5 mm.) Lens on H.8 Focus on 10 ft.
1.4-1.5	—	11-23	$6\frac{1}{4}$ -24
1.9-2	—	10-27	$5\frac{1}{2}$ -40
2.5	—	$9\frac{1}{2}$ -37	—
2.8	4-∞	9-46	5-∞
4	$3\frac{1}{2}$ -∞	$7\frac{1}{2}$ -∞	4-∞
5.6	$2\frac{3}{4}$ -∞	$6\frac{1}{2}$ -∞	3-∞
8	$2\frac{1}{4}$ -∞	$5\frac{1}{4}$ -∞	$2\frac{1}{2}$ -∞
11	$1\frac{1}{2}$ -∞	$4\frac{1}{4}$ -∞	2-∞
16	$1\frac{1}{4}$ -∞	3-∞	$1\frac{1}{2}$ -∞
22	1-∞	$2\frac{1}{2}$ -∞	1-∞

Tone and Colour Rendering

It is always important that the film shall reproduce the various tones of contrast in a subject in a way that the audience will accept without question.

Filters can be used to give dramatic results by over-correction but these results should be intentional and never accidental. Dark skies with glaring white clouds can add beauty to some scenes but can look completely out of place in others.

With regards to colour rendering, it is equally important when using colour film that the reproduction of known colours should be accurate. No one expects a fire engine to be a pale shade of pink for instance.

The Mechanics of Filming

The way in which the camera is used can in itself make or ruin a film. The points worthy of attention are:

- Steadiness,
- Length of shot,
- Camera movements,
- Shot transitions,
- The use of different lenses,
- Special effects, and
- Use of long and close shots.

The importance of camera steadiness cannot be over-emphasized. Any vibration or jerky movement of the camera when it is being used

will be greatly magnified when the film is projected. If you must hold the camera without any support—hold it still! Anything that will steady the camera should be brought into use (p. 40). A tripod must be employed whenever a telephoto lens is used.

Length of Shot

The length of time that a scene is filmed will depend on the amount of interest that it will have for the audience. It is annoying for an audience to have their interest aroused by something and then have the scene change to something else after only a second or two. It will not matter if the scene is held too long for this can be remedied by cutting the finished film.

If you are in doubt about the length of time to run the camera for the average scene you will find that 8 seconds will be about right at 16 f.p.s. This will give the audience time to see all that is going on.

When filming sign-posts or any reading matter, correct timing can be obtained by slowly reading the wording whilst filming. When you come to the end, stop the camera.

If a sequence of events is to be filmed without a break, check that the motor is fully wound and that 19 ft. of film will be sufficient to cover the action. If not, you must employ a driving motor.

Camera Movements

The golden rule is—move the camera as little as possible. Let the subject do the moving! This is the essence of successful camera work. Select subjects that are full of life and your film will live.

Imagine a country garden covering a large area. You could commence filming at the extreme left of it and pan your camera to the right until you had covered the whole but think how much better it would look if you introduced a person into the scene and asked him to walk about the garden stopping here and there to admire. You could hold the camera still for each separate shot, but occasionally follow the person when he started to walk out of your field of view.

Shot Transitions

The beginner will no doubt cut from one scene to another throughout his first few films. These straight cuts are monotonous to watch and if one scene cuts straight to another of entirely different brilliance the result will strain the eyes.

It is very simple with a Bolex camera to introduce many different transitions from shot to shot.

Fades (p. 82), lap dissolves (p. 84), wipes and vignettes can easily be produced and these will give the final result a polish that is impossible if the straight cut is used alone.

The Use of Different Lenses

These lenses, together with the wide angle lens, can add a great deal of interest to a film if they are correctly used.

For instance, a telephoto can be used to show fine detail in a piece of architecture that is inaccessible to the camera. It can equally produce close-ups shots of people without their knowledge.

The telephoto lens does have one or two disadvantages however. Pictures given by a telephoto tend to be flat and without relief. This is because the perspective of a subject appears to be compressed.

Another point is that the subject's movement towards the camera appears to be slowed down. A runner will appear on the film to be running hard towards the camera but advancing hardly at all.

Focusing with all telephoto lenses must be very accurate because of the shallow depth of field that they allow. Use the critical focusing screen on the Bolex whenever possible!

The wide angle lens will enable you to include on the frame the complete subject area when you are filming in a confined space. A wide angle lens has one less obvious advantage. As an example, consider a film that is to be made of a wedding group outside a church. There is no restriction of space yet we find that with a 1 in. (25 mm.) normal lens we have to stand so far away from the group that we include in our picture the numerous photographers who with their short focus lenses are busily engaged in the production of wedding stills.

If we employ a wide angle lens in our Bolex turret we will be able to operate at the same distance from the group as the still photographers and nothing will obstruct our field of view.

Special Effects

The whole range of trick effects is possible on the Bolex camera and should be at your command. Trick photography can be used to liven up a film but tricks should be employed only if they add point to the film. They are good fun to produce and everyone enjoys an occasional film full of tricks but they easily become tiresome if overdone.

Use of Long and Close Shots

There are certain recognized shots used in cine photography which lead logically from one to the other. They are classified by the amount of the subject that is included in the field of view and the apparent distance of the subject from the camera.

We therefore refer to:

Long shots (general views),

Medium shots (near views),

Close-ups, and

Large close-ups.

The long shot is used to establish the general scene. It tells the audience where the action is taking place.

The medium shot is taken close enough to reveal the presence of people in the scene. It introduces the actors to the audience.

The close-up is used to present a person's face, his hands or some part of the scene that requires special attention.

The large close-up shows very small details of the subject enlarged.

These set shots should be interspersed with each other so that long shots and medium shots locate the scene of action and close-ups and large close-ups describe the action in detail.

When changing from, say, a long shot to a medium shot, and then a close-up of the same scene, change your camera direction too. Otherwise the audience appear to be brought up to the subject in a series of disturbing forward jerks or jumps.

The Artistic Approach

Obviously, some people will be better than others in producing a film with artistic merits. It is possible for anyone to learn the basic requirements in order to produce this type of work but it will require practice in thinking in terms of pictures. Even cine pictures should be composed along the well-proven lines of the painter and the still photographer.

A scene of rolling meadows and wheat fields may be beautiful to look at but appear completely insignificant on the screen. What is needed in this case is foreground interest; a figure, a tree, a farm tractor, must be included so that the picture looks like a scene and not scenery.

Before you shoot a scene, walk round it and explore its possibilities—use the camera viewfinder to frame it. Take your time, carefully arrange it as far as you can to make the most of it.

Atmosphere

Atmosphere in a film can be greatly assisted by lighting and the use of space.

For instance if a scene is to appear grim and forbidding it should be arranged so that there is no wide expanse of sky, and lit with sombre dull lighting, full of heavy shadows.

The opposite effect can be obtained by making the scene appear airy and well lit.

It is ability to convey feeling in pictures that counts. You feel that a certain subject should be presented in a certain way and go ahead. If the finished scene on the screen produces the atmosphere that you intended then you have succeeded.

Give your senses of drama, of emotion, of sentiment a chance. They cannot be controlled by a rigid set of rules and they will assist you to reduce the feeling that a scene exerted over you.

Tempo

The film must possess the correct tempo or the subject or the theme. For instance, let us consider a film of a boxing match and a film of life on a river. They both suggest their own tempo. If the same technique were applied to both, the results would be a dismal failure.

With the boxing match a series of close-ups cut straight into each other, with each shot lasting only a second or two. This creates a fast pace that catches up the audience as though they were in the arena.

On the other hand the river scene is best depicted as slow and leisurely by employing a series of long shots and medium shots. They can be connected with fades and dissolves and all last on the screen for the same period of time, say 8 sec. each.

These extreme examples will show the idea and purpose of tempo.

The Story

When you are planning to produce a film that will tell a story you must decide whether you are going to use a shooting script or not. Without a script you run the risk of making a picture that wanders along and digresses from the main theme so many times that it appears illogical and pointless to your audience.

There are two ways in which you can produce a shooting script for your proposed film. The first method is best suited for the family film or the travel or holiday type of film.

In order to introduce a story into the family film you should first try to visualize a logical sequence of events. Writing to the hotel, looking up train times, packing bags, consulting the barometer—all these ideas should be filmed and the sequence should be carried on until the return home. You need not stick rigidly to any preconceived plan but can vary the theme as the holiday progresses. The only important thing to remember is to keep your film full of explanation shots.

The more ambitious film will require a written shooting script.

The film may, for instance, show the activities of a sports club. The first thing to do is arrange a conference of the people who are authorities on the club, who know its history, its members, its activities and its methods. At this conference a table of contents should be prepared for the film. Include everything of interest and then eliminate the least important until you are left with a concise written summary.

The next job is to select the actual events that you intend to film and make out a list of these. Each event must be considered as a separate subject. It is now possible to get down to the task of writing the script for the film. This script must include every shot that is to be taken. It must include the angle of view required, the shot required—close-up or long shot—the duration of each shot, the action, etc.

The written script has many advantages over the mental one. It is much easier to alter the order of events, or the activities to be filmed before the film is made than it is to make these changes afterwards.

FILMING IN COLOUR

Points to Watch

1. Make sure that the film is exposed by the correct illuminant. If not, compensate with a filter.
2. Avoid subjects that include extreme contrasts of light and shade.
3. Have the sun shining from behind the camera whenever possible.
4. If it is raining—don't shoot.
5. Arrange your colours harmoniously. Remember, some colours clash.
6. Use either daylight or artificial light on your subject—not both, unless you require a special effect.
7. Watch out for reflected colours.
8. Get the exposure setting right—use an exposure meter.
9. Never use a red, blue, green, yellow or any other coloured filter on your lens unless you want the finished film to be red, blue, green or yellow.

Although there are several types of colour film in use to-day they all employ similar tri-pack emulsions. They are all available for both the H.16 and H.8 camera. You load the film into the camera in exactly the same way as any other film but a slightly different technique is used for filming so that the best results may be obtained.

Colour Films and Light

Most colour films are manufactured in two different types, for daylight and for artificial light (Tungsten, Type A).

The daylight emulsion is designed to give accurate colour rendering when used outdoors, at noon on a sunny day with a blue sky and white clouds. The colour temperature under these conditions is 5,900° Kelvin. If the film is used within two hours of sunrise or sunset, a predominance of red will be noticed in the result, particularly on white surfaces and peoples' faces.

In order to neutralize the excessive red in the sunlight and obtain correct colour rendition on the film, a colour temperature meter and colour correction filters should be employed. It is best therefore, to confine filming in colour to within the hours between two hours after sunrise and two hours before sunset, unless you specially want to use the character and atmosphere of that lighting.

The Type A emulsion is designed for use with Photoflood lamps and balanced for a colour temperature of 3,450° Kelvin. The Tungsten emulsion (Ansco Color) is balanced for 3,200° Kelvin. If either is used with any other artificial illuminant a colour temperature meter and filters should once again be used in order to obtain correct colour reproduction.

Exposure for Colour

The main difficulty that you may experience with colour films, is the accurate calculation of exposure. This is because colour film has a very small exposure latitude. That is to say that the brightness range in a subject that can be correctly exposed on the film is very small. If the subject contains extreme degrees of contrast, for instance the shaded porch of a log cabin on a snow-covered mountainside, it will not be possible to get an accurate exposure of both the extremes. The best possible result will still remain a compromise.

Therefore, the best type of subject for a colour film is one that is evenly lighted and that contains no large extremes of contrast. If possible, always try to have the sun shining from behind your camera.

If you are making a film portrait of a person and you wish to use side lighting, a reflector should be employed to lighten the shadows cast on the unlit side of your subject's face. Otherwise very little detail in the shadows will be visible.

With fast aperture, coated lenses, it is not necessary to wait for sunshine before exposing colour film. Excellent results can be obtained without sunlight providing the sky is not overcast. If colour film is exposed on a rainy, gloomy day, the result will be flat and colourless.

An exposure meter is essential if accurate results are to be obtained throughout the complete length of the film. Correct exposure ensures the most nearly correct colour rendition.

The results of over-exposure on colour film can be judged by the washed-out appearance of the colours. The results of under-exposure will appear to be muddy and heavy.

If you know before exposing a film that you will want to make a duplicate from the original, under-expose the film by one half of a stop. The resulting duplicate made from this slightly under-exposed film will be of better colour value.

Colour Casts

Have you ever noticed what happens to the faces of people standing in a London bus queue when a bright red bus drives up alongside them? Reflected light from the bus will provide each person with a bright red face. The human eye does not generally discern changes in the colour of a familiar object due to reflected light but becomes much more critical when viewing a movie film on a screen.

Your colour film lens will record exactly what it sees. If the colour of your subject is distorted by reflections from other surfaces, the camera lens will reproduce on the film the reflected colour as well as the original colour.

The white sails of a yacht provide another excellent example of what reflected colour can do to a subject. Quite often white sails will appear to be blue when filmed in colour, the blue being reflected from the

sky by the surrounding water. The answer to this problem of reflected colour is to train your eye to see it when it occurs and avoid it.

Colour Harmony

Your first colour results will no doubt thrill you. You will probably see colour in subjects where you thought none existed. From then on the temptation will be to introduce as many vivid colours into your subject as possible.

This is wrong! Colour composition is as important as subject composition. Dramatic use can be made of one predominant coloured feature in a scene that is otherwise comparatively pastel, in the same way that the eye is drawn to a red carnation worn on a dark grey suit.

Mixed Light

As either type of colour film is balanced or use at one colour temperature, unpredictable results will be obtained if daylight and artificial light are mixed.

The large exhibitions held in London arenas offer a good example of mixed lighting conditions. You may find that daylight is flooding through the glass roof, but that the exhibitors' stands are lit with artificial light of different kinds, neon, incandescent and others.

On daylight type colour film, the portions of the scene lit by daylight will show correct colours but the remainder will be false.

On the other hand if type A colour film is used the portions of the scene lit only by artificial light at the correct colour temperature (3,450° Kelvin) will be correctly exposed. Under the conditions mentioned, no part of the scene may be lit by Photofloods at all.

There are times when a mixture of illuminants will not matter, in fact the mixture can be used to produce extremely dramatic and colourful effects. For instance, if you want to film advertising signs in the street, you should load your Bolex with daylight type film and shoot it just after the sun has set and the lights have been switched on. It will not matter in the least if the colour of the neon signs is not accurately recorded. The effect of partial daylight and brilliant neon will be much more pleasing than if shot late on type A film.

Do not use any normal coloured filter on the Bolex lens when filming with colour film. Apart from the colour correction filters (p. 60), there are only two filters that may be required.

One is a conversion filter (e.g. Wratten 85) for use when Kodachrome type A film is exposed by daylight. Similarly, you will need an Ansco No. 11 filter for Ansco Color Tungsten exposed in daylight.

The other is a haze filter. A haze filter should always be used when filming landscapes, seascapes or from a high altitude. It will eliminate the haze normally found in this type of scene.

If a haze filter is not employed a misty blue fog will be noticed in the background of the scene.

TAKING CARE OF THE BOLEX

Your Bolex is a precision-made product and should be treated as such. Carefully maintained it will provide reliable service for many years.

The camera should always be kept free from dust. The film chamber should be thoroughly cleaned out with a brush immediately before a film is loaded.

Scraps of emulsion may collect in the gate or on the pressure pad. These should be carefully removed with a clean cloth wrapped round the end of a pencil. If the emulsion is hard and difficult to remove, dampen the cloth slightly and when finished wipe the gate with a dry cloth.

Lenses should always be handled with the greatest care. The surfaces should occasionally be wiped gently with a very soft lens tissue.

If the Bolex has been used on a sandy beach you should carefully inspect all the small apertures and crevices in the camera and completely remove every grain of sand.

Oiling

The Bolex mechanism will seldom require oiling, and when it does it should be returned to the supplier.

If for any reason this is not possible the owner of the camera may wish to carry out the following routine.

Use a fine non-freezing chronometer oil, entirely free from acid. Allow one or two drops to fall on all the visible shafts of the mechanism. A few drops of oil should also be placed on the cam of the claw.

When this has been done, run the mechanism for a few seconds and then wipe off any excess oil.

Never attempt to dismantle the mechanism of the Bolex camera. This should always be entrusted to the supplier.

CONVERSION OF FEET AND INCHES INTO METRIC UNITS

Bolex cameras are marked only in either the metric or British system, while most of the tables in this book are also given in only one system. The following table shows at a glance equivalent lengths.

British to Metric.		Metric to British.	
$\frac{1}{8}$ in.	0.32 cm.	0.5 cm.	$\frac{3}{16}$ in.
$\frac{1}{4}$ in.	0.64 cm.	1 cm.	$\frac{1}{2}$ in.
$\frac{3}{8}$ in.	1.27 cm.	2 cm.	$\frac{13}{16}$ in.
1 in.	2.54 cm.	3 cm.	$1\frac{1}{16}$ in.
2 in.	5.08 cm.	4 cm.	$1\frac{9}{16}$ in.
3 in.	7.62 cm.	5 cm.	$1\frac{13}{16}$ in.
4 in.	10.2 cm.	6 cm.	$2\frac{3}{8}$ in.
5 in.	12.7 cm.	7 cm.	$2\frac{7}{8}$ in.
6 in.	15.2 cm.	8 cm.	$3\frac{1}{8}$ in.
7 in.	17.8 cm.	9 cm.	$3\frac{1}{2}$ in.
8 in.	20.3 cm.	10 cm.	$3\frac{15}{16}$ in.
9 in.	22.9 cm.	12 cm.	$4\frac{1}{2}$ in.
10 in.	25.4 cm.	15 cm.	$5\frac{7}{8}$ in.
11 in.	27.9 cm.	20 cm.	$7\frac{7}{8}$ in.
1 ft.	30.5 cm.	25 cm.	$9\frac{13}{16}$ in.
2 ft.	61.0 cm.	30 cm.	$11\frac{3}{4}$ in.
3 ft.	91.4 cm.	40 cm.	$15\frac{3}{4}$ in.
4 ft.	1.22 m.	50 cm.	$19\frac{3}{4}$ in.
5 ft.	1.52 m.	60 cm.	$23\frac{5}{8}$ in.
6 ft.	1.83 m.	80 cm.	$31\frac{1}{2}$ in.
7 ft.	2.13 m.	100 cm.	$39\frac{1}{2}$ in.
8 ft.	2.44 m.	1.5 m.	4 ft. 11 in.
9 ft.	2.74 m.	2 m.	6 ft. 7 in.
10 ft.	3.05 m.	2.5 m.	8 ft. 3 in.
15 ft.	4.57 m.	3 m.	9 ft. 10 in.
20 ft.	6.10 m.	4 m.	13 ft. 2 in.
30 ft.	9.14 m.	5 m.	16 ft. 5 in.
40 ft.	12.20 m.	10 m.	33 ft. 0 in.
50 ft.	15.24 m.	15 m.	49 ft. 2 in.
100 ft.	30.48 m.	20 m.	66 ft. 0 in.

Some items of equipment or certain materials mentioned in this book may not be freely available in every country. Import and marketing conditions vary widely, and are outside the control of the photographic retailer.

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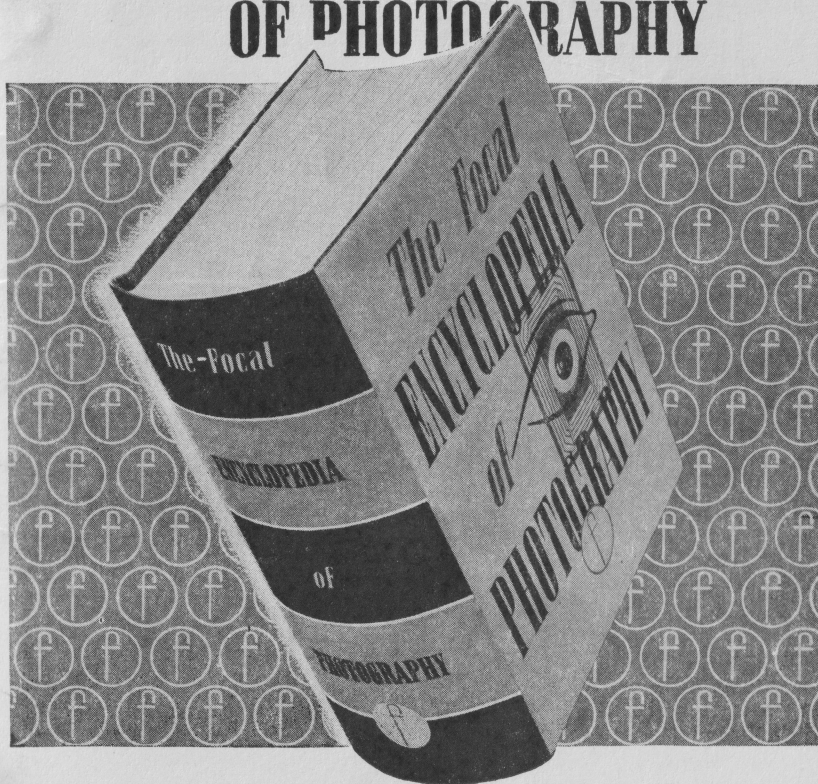
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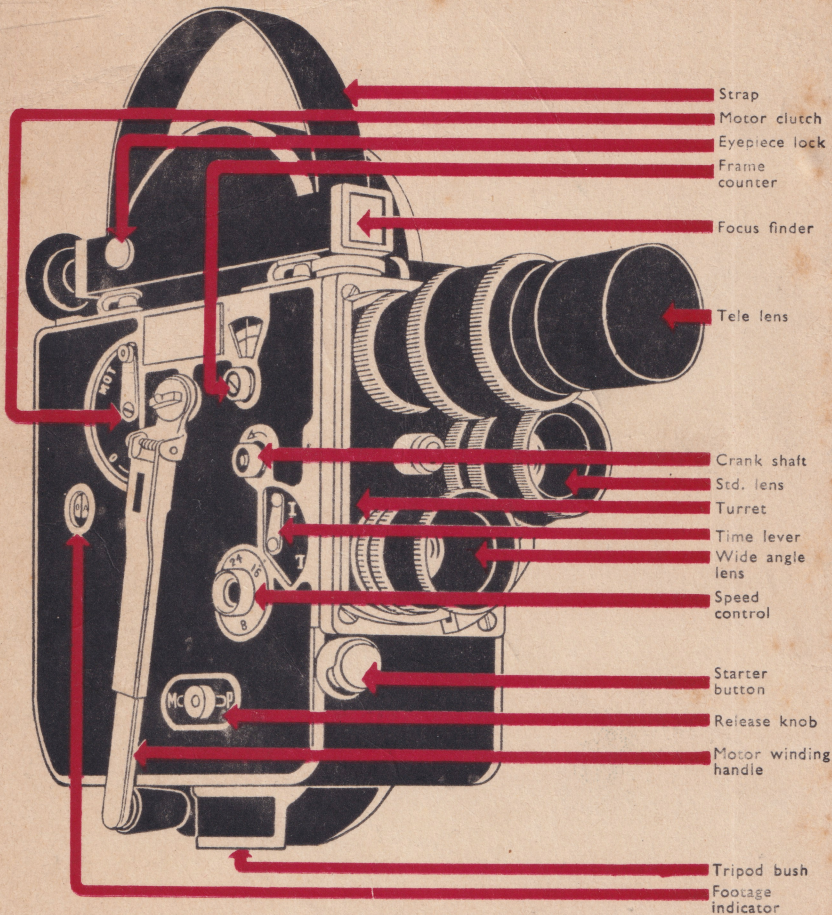
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